



# REPORT

Volume IV

## PART II

### Recommendations of the Commission

CHAPTERS XXX—XXXIX



CALCUTTA  
INDEPENDENT GOVERNMENT PRINTING, INDIA  
1916

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# REPORT

Volume IV.

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PART II

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CHAPTERS XXX—XXXIX



CALCUTTA  
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1919



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*Section VIII. The recruitment and position of teachers in intermediate colleges and high English schools.*—(85) Administrative cleavage between Government schools and colleges on the one hand and private schools and colleges on the other hand, should be lessened. (86) Such a process of greater unification depends on changes in the methods of recruiting and paying teachers. (87) The two distinct methods of recruitment now in use. (88) The system of recruitment for Government schools should be more elastic; that for private schools should offer greater security and better prospects. (89) The system of Government service for teachers has brought many benefits to Bengal, has a tenacious hold on the public mind and cannot quickly or suddenly be discarded. But an improved system should replace it. (90—91) Recommendation of new conditions of appointment for teachers in Government schools and intermediate colleges; (92) and in aided and unaided schools. (93) Recommendations of a superannuation system open to all teachers in secondary schools and intermediate colleges. (94) Benefits under the proposed superannuation system. (95) Removal of obstacles to promotion and transfer. (96) Suggested future extension of the new system to the administrative posts in education. (97) Advantages of a change which would make the teaching profession in Bengal a unified and organised profession. (98) An illustration of the way in which the new system would work. (99) Need for some teachers who have had special training or experience outside Bengal. (100) How can the aid of such teachers be enlisted? (101) A head-quarters corps of western-trained teachers, Indian and European, required. (102) Recommendation that a special corps of teachers should be formed. (103) The work which members of the corps could do. (104) Its members should not be organised on the same lines as those followed in the present service system. (105) A satisfactory organisation of the teaching profession in Bengal depends upon all schools, public and private alike, coming into connexion with a central authority and receiving from it guidance and help without any such interference as would impair legitimate freedom.

*Section IX. The aims of secondary education.*—(106—107) The liberal education which secondary schools should aim at giving to their pupils. (108) The shortcomings of the great majority of secondary schools in Bengal. (109) The establishment of intermediate colleges would produce a great improvement in the present conditions; (110) would be beneficial to the University; (111) advantageous to the whole community; (112) and would influence for good the whole of the educational system of the Presidency.

## CHAPTER XXXII.—THE INTERMEDIATE COLLEGES.

*Section I. The organisation of the colleges.*—(1) Summary of the reasons for establishing them. (2) They are the pivot of our scheme. (3) Necessity for unified control. (4) It is impossible to add intermediate classes to all schools. (5) The proposal to combine the two intermediate classes with the two top classes in special institutions is attractive, but impracticable in Bengal. (6) Various modes of providing the colleges: (7) use of selected high schools; (8) re organisation of second-grade colleges; (9) creation of special institutions. (10) How the intermediate classes in first-grade colleges should be treated.

*Section II. General features of the system.*—(12) The colleges will serve a double purpose—training some students for university work, others for practical life. (13) These should not be sharply differentiated. (14) In every case a liberal training must be given. (15) Therefore the courses though differentiated should all give access to the University. (16) There should be no distinction between arts and science courses. (17) The methods of teaching to be those of a good school.

*Section III. The general liberal element in the courses.*—(18) There must be a common element in all forms of the course. (19—20) Practical teaching of English. (21) Vernacular. (22) Mathematics need not be compulsory at this stage if a higher matriculation standard is exacted. (23) Courses not to be too rigidly defined. (24) Natural science for arts students. (25) Desirable elements in an arts course. (26) The treatment of classical languages. (27) Special provision for Musalmans. (28) The course necessarily wide in its range. (29) Course for science.

*Section IV. Preliminary training for medicine and engineering.*—(30—32) The utility of intermediate courses as a preparation for different kinds of medical courses. (33) Training in preparation for engineering courses.

*Section V. Agricultural courses.*—(34) Need for agricultural training less exacting than a degree course. (35) Outline of such a course.

*Section VI. Training of teachers.*—(36) Why necessary at this stage. (37) Outline of a proposed course. (38) Its relation to university courses in education. (39—41) Importance of these courses.

*Section VII. Commercial training.*—(42—44) Needed at an earlier stage than the degree. (45) Summary of the requirements. (46) Outline of a course. (47) Useful also for Government service.

*Section VIII. Various types of colleges.*—(48—49) General requirements of all types of courses; (50) but the colleges should specialise. (51) The examination.

*Section IX. Non-academic sides of the intermediate college.*—(52) Their importance. (53) Need for playgrounds and physical training. (54) Residential accommodation. (55) These requirements affect cost.

*Section X. Estimate of cost.*—(56) Capital expenditure. (57) Annual outlay. (58) Total estimated cost of the scheme. (59) Opportunities for private benevolence. (60) The great advantages of the system. (61) Can only be realised if expenditure is not stinted.

### CHAPTER XXXIII.—THE UNIVERSITY OF DACCA.

*Section I. The existing schemes for establishing a university at Dacca.*—(1) Introductory. (2—4) Addresses to the Viceroy, January and February 1912. Decision to establish a university at Dacca. (5) Appointment of Dacca University Committee. (6—7) Report and detailed recommendations of Committee. (8) Publication, criticism and postponement, owing to the war, of the Dacca scheme. (9—12) Debate in Imperial Legislative Council on 7th March 1917 on motion of Nawab Syed Nawabaly Chaudhury. Decision of Government to submit the scheme to the present Commission; renewed assurances that a university will be founded at Dacca. (13) Government *communiqué* of November 1917 on position of scheme.

*Section II. Discussion of the main features of the scheme proposed by the Commission.*—

A. (14) Introductory. (15—16) The establishment of a university at Dacca is in harmony with the general policy of the Commission; special advantages of Dacca as a university centre. (17) Public opinion on this point. (18) The special functions which Dacca should fulfil in stimulating education among the backward Muslim population. (19) The Commission agree with the proposal that the Dacca University should be a unitary (non-affiliating) university, and that it should be teaching and residential, but not that it should be a Government institution. (20) The Commission think that the University should be freed from intermediate teaching; and control directly the whole of the teaching given under it; the 'colleges' to be replaced by 'halls of residence'.

B. (21—29) Discussion of proposals that Dacca should be a 'residential and affiliating university', on the model of Patna; or, a 'federal university'. Rejection of these proposals. (30—35) Discussion of the proposal that the 'college' should be the teaching unit of the University. Reasons for making the University responsible for all the formal teaching. (36) The college should retain its functions as a residential unit. (37—39) The Commission accept, with some modification, the general policy of the Dacca Committee in regard to residential organisation; students to be allowed to live with parents and approved guardians under strictly defined conditions. (40—43) Discussion of the general principles of a residential system. (44) The intellectual and social side of the system. (45) Non-resident students to share as far as possible the benefits offered to resident students. (46—47) Newman's views on the residential and tutorial elements in a university. The University should give both lectures to large audiences and tutorial training.

C. (48) The Commission agree with the Dacca Committee in regard to the ideal of the training to be given by the University, but not in regard to the organisation required. (49—51) Policy of the Dacca Committee in regard to Government control of staff, finance and regulations; general defects of that policy. Difficulties to be faced. (52—59) Question of staff. Advantages and disadvantages of the service system; new system proposed. (60—64) Finance. Proposal of block-grant system, with careful safeguards. (65) Discussion of general question of 'autonomy'. Views of witnesses connected with

Dacca in favour of 'autonomy'. (66) Regulations. Scheme for classification of university legislation into Statutes, Ordinances and Regulations, according to the different degrees of public importance of matters dealt with; the University to have freedom in managing academic detail, but public interests to be safeguarded.

D. (67-68) The University to be open to all. Principle which should guide acceptance of benefactions limited to one community. (69) Size of the University. Necessity for limiting the number of undergraduate students at Dacca in their own interest. If the pressure of undergraduate students is excessive, provision could best be made for them by the foundation of a second multifaceted university.

E. (70) General sketch of the University. (71) The residential side. (72) The general teaching organisation. (73) The general executive and legislative organisation. (74) Facilities for Muslim students. (75-76) Pass, honours M.A. and M. Sc. courses. (77) The Department of Islamic Studies, Department of Sanskrit Studies, English Department. (78) Vernacular languages. (79) French and German. (80) History, economics, sociology, etc. (81) Mathematics, geography. (82) Necessity for development of science side. (83) Law. (84) Admission to the university of persons other than candidates for degrees. (85) Development of original investigation. Necessity for adequate library. (86-87) Future developments.

### *Section III. The teaching organisation of the University.—*

A. (88-90) Staff. (91-96) Departmental organisation. (97) Departmental libraries.

B. (98-108) Department of Islamic Studies and the reformed madrasah scheme. (109) Department of Sanskrit Studies. (110-114) Faculty of Law. (115-122) Question of Faculty of Medicine and of relations of Dacca Medical School with the University. (123) Question of Faculty of Agriculture. (124-126) Question of Faculty of Engineering and of the Dacca School of Engineering. (127-128) Education of women. (130-134) Department of education and Training College. Proposed hostel for Training College.

### *Section IV. The residential organisation of the University.—*

A. (135) The 'hall' substituted for the 'college' of the Dacca University Committee; (136) its size; to be presided over by a provost. (137) The hall to be composed of 'houses'; teaching given in halls; architectural requirements. (138-139) House-tutors and assistant-tutors; their relations to provosts. (140) Attachment of non-resident students to halls and houses. (141) Attachment of teachers to halls. Staff committee. Special advisory committee in certain cases. Other committees. (142) Special estimates for halls; catering and kitchen arrangements. (143) Smaller residential units to be called hostels and organised on lines similar to halls. (144) Halls required at initiation of university.

B. (145) The Muslim Hall; will provide wider educational opportunities for Muslim students than the proposed 'Muhammadian College'. (146) Its foundation to be accompanied by foundation of 'intermediate college for Muslim students with suitable hostel accommodation; future residential provision for Muslim students in Dacca University. Question of second Muslim hall; and of 'mixed' houses. (147) Relations of Muslim Hall with Department of Islamic Studies.

C. (148) The Dacca Hall. (149) To meet reasonable needs of students for whom the Dacca Committee proposed a college for the well-to-do classes some provision might be made in Dacca Hall and other halls; no distinction in teaching arrangements to be made for such students, and cost of accommodation to be met by hostel charges.

D. (150—154) The Jagannath Hall; discussion of difficulties arising out of present situation and possible solutions. (155) Question of Jagannath Hall as a hall 'for poor students'. The fee for halls should be identical; further provision of stipends for poor students. (156) Question of erection of Jagannath Hall on Ramna site. (157) Representation of Jagannath trustees on advisory committee for Jagannath Hall. Question of existing staff of Jagannath College. (158) Hostel for special classes including Namasudras. (159) Hostel accommodation for European and Anglo-Indian students.

E. (160—166) Private halls and hostels. Missionary hostels. ~

*Section V. The administration of the University.*—(167) Introductory. (168) Authorities of the University. (169) The Visitor. (170) The Chancellor. (171—174) The Vice-Chancellor. (175) The Treasurer. (176) The Registrar. (177) The Proctor and the University Steward. (178) The Librarian. (179) Distribution of functions among various university bodies. (180—184) The Court. (185) The first register of graduates and electoral roll of the Court. (186—187) Admission to the electoral roll; fees; co-operation of graduates in the work of the University. (188—189) The Executive Council. (190—191) The Academic Council. (192) The Faculties. (193) The Boards of Studies. (194) Other Boards and Committees. (195) The Muslim Advisory Board. (196) The Residence, Health and Discipline Board. (197) The Examinations Board. (198) The Finance Committee, Buildings and Estate Committee, Appointments Committee or Board, Library Committee. Power of appointment of persons other than members of Councils on committees of the Councils.

*Section VI. The scholarship system.*—(199) Scholarships, research-studentships, free studentships, stipends. Provision for Muslim students.

*Section VII. Discipline, social life and physical training.*—(200—203) Discipline. (204—205) Social life and games. (206) Physical training.

*Section VIII. Entrance qualification for admission to the University.*—(207—210) Entrance qualification. Transitional measures.

*Section IX. Transitional arrangements.*—(211) Intermediate teaching. (212) Establishment of Muslim intermediate college, and (213) one or more other intermediate colleges; and of intermediate education to follow on the final examination of the senior madrassahs. (214) Admission to University. (215) Privileges of students at present reading for Calcutta degrees. (216) First appointments to the teaching staff. (217) Constitution of the first university bodies.

*Section X. Limits of university jurisdiction. Relations of Dacca with other universities. Dacca Educational Joint Committee.* (218) General question of relations of Dacca University with secondary schools and intermediate colleges. (219) Question of limits within which institutions connected with the University of Dacca should be placed. (220—221) Question of exclusive privileges of Dacca University within such area. University legislation should not be so framed as to exclude possibilities of inter-university co-operation and migration from one university to another especially for post-graduate studies. (222) Dacca University should be protected by Statutes from any unfair competition in the area to which it is restricted; but the University Act should not exclude

all possibility of creating within that area an institution of university rank not connected with Dacca University. (223) Discussion of Mr. Archbold's suggestion that students within a given area should be debarred for a limited period from attending any university other than Dacca. Advantage to university students of mixing with students from other provinces. (224) Suggested Dacca Educational Joint Committee.

*Section XI. Land, buildings, etc.*—(225) Proposed transfer of buildings to the University or to trustees on its behalf. (226) Question of maintenance of university buildings and estate. (227) Question of relations with municipal administration. (228) Allocation of existing buildings on the Ramna.

*Section XII. Finance.*—(229) The capital cost of intermediate colleges in Dacca should be in part paid for out of the capital fund allotted to the University. The Commission believe that the changes of organisation proposed will render possible some savings on the cost of Dacca University as contemplated under the scheme of the Dacca University Committee. Outline of estimates.

*Section XIII. Conclusion.*—(230) The future of Dacca University. (231) The Commission urge that the University should be founded without further delay. (232) Indebtedness of the Commission to the report of the Dacca University Committee and other official documents, and to officials of Dacca and Jagannath Colleges.

## CHAPTER XXXIV.—A TEACHING UNIVERSITY IN CALCUTTA.

*Section I. The need for reorganisation.*—(1) The chapter to be confined to the teaching of men in the Faculties of Arts and Science. (2—3) The materials for reconstruction of the colleges and the university teaching system. (4—5) The post-graduate classes of the University; drawbacks of the system. (6) Effects of proposed removal of intermediate students. Estimates of numbers to be dealt with. (7) This may suggest the desirability of delay.

*Section II. Some projects of reform.*—(8) Many schemes put forward. (9—11) Proposals involving no fundamental change. (12) Proposal that Presidency College should become the centre of a State university. (13—16) Criticism of the proposal. (17) Proposal that the University should undertake all honours work and incorporate Presidency College. (18—20) Criticism of the proposal. (21—22) The impracticability of a unitary university in Calcutta. (23) Both the schemes discussed have elements of value.

*Section III. A new synthesis required.*—(24) The history and circumstances of Calcutta require a new type of university. (25) It must be a university of colleges. (26—27) The conditions necessary for success. (28) The nature of the relations between the University and the colleges must depend upon the kind of training to be given.

*Section IV. The duration of the degree course.*—(29) The present system. (30) A three years' course for the B.A. or B.Sc. after the intermediate stage is desirable. (31) It should be introduced first for honours students. (32) The M.A. and M.Sc. courses should be changed for honours students, and (33) for pass graduates. (34) Summary of proposals.

*Section V. Differentiation of courses of study.*—(35) Separate honours courses necessary. (36) though not necessarily entirely distinct. (37—39) The lines of distinction between honours and pass courses. (40) Selection of students for honours courses, and (41) transfer from pass to honours (42) Reorganisation of

pass courses in groups; (43) one of which should include education. (44—46) The treatment of English. (47) Summary of proposals.

*Section VI. Methods of instruction.*—(48—50) Lectures, and the conditions under which they can be most profitably employed. (51) A complete departure from the present system necessary. (52) The respective functions of the University and the colleges in a revised system of teaching. (53—54) Need for organised tutorial guidance. (55) A description of tutorial work at its best. (56—57) It is in accord with Indian tradition and is gravely needed. (58—59) This is mainly the work of colleges. It demands able men, and the best lecturers should take part in it. (60—61) Proposed recast of conditions of lecture-attendance. (62) Importance of the part played by the colleges in this scheme. (63) The change must be gradual. (64) All students should be members of colleges, (65) except in some cases M.A. and M.Sc. students. (66) Summary of proposals.

*Section VII. Advanced study and investigation.*—(67—68) The importance of original investigation. (69—70) Dangers of a mechanical conception of 'research.' (71—72) Research necessary at every point, and every student should be in some sense a researcher. (73) Distinction between two types of teaching, one aiming at understanding, the other at dexterity. (74—75) In the former case the spirit of research indispensable. (76—78) Necessity of organised research in order to keep teaching alive.

*Section VIII. The academic governance of the University.*—(79) An anticipatory survey for the sake of clearness. (80) The Court and the Executive Council. (81) The necessity of an organisation of teachers. (82) Academic Council, etc. (83) To include representatives both of colleges and of university teachers. (84—85) The Vice-Chancellor

*Section IX. The functions of the University.*—(86) Introductory. (87) University buildings. (88) University library, and (89) laboratories. (90—92) Teaching in subjects not dealt with by colleges, and (93) supplementary teaching in college subjects. (94) Organisation of co-operative teaching. (95) Financial arrangements. (96) Modification of existing functions. (97) Definition of curricula. (98) Methods of examination. (99—100) Inspection and supervision of colleges

*Section X. The teaching staff of the University.*—(101—102) Need for definition of teaching grades. (103—104) University professors; (105) readers; (106) categories of teachers; (107) wholly paid by the University; (108) partly paid by the University, partly by a college; (109) wholly paid by a college. (110—111) Recognition of college teachers.

*Section XI. Methods of appointment.*—(112) Importance of care in university appointments. (113) The special difficulties of India. (114) Proposed special procedure in appointments, (115) (a) for pure university posts, (116—120) (b) for posts partly or wholly paid by colleges.

*Section XII. The requirements of constituent colleges.*—(121) Constituent colleges in a teaching university require very different conditions from colleges in an affiliating university. (122—123) Treatment of intermediate students. (124) Size of colleges: maximum of 1,000 recommended. (125) Proportion of teachers to students. (126—127) Qualifications of teachers. (128) Distribution of teachers among subjects. (129) Conditions of tenure and salary of teachers. (130) Equipment and accommodation. (131) Residence of students. (132) Government of colleges. (133) Help needed to enable colleges to meet those needs. (134) Privileges of constituent colleges. (135) College autonomy in moral and religious matters, and (136) in the disciplinary control of students. (137—

139) Conflicts of jurisdiction: proposed Committee of Discipline. (140) Applications of colleges for aid from public bodies.

*Section XIII. Temporarily affiliated colleges.*—(141) Some colleges cannot at once meet the conditions laid down. (142) Provision necessary for them, if the new system is introduced at once, but it should not be of such a kind as to compromise the system. (143) Temporary affiliation proposed, (144) on new conditions. (145) Courses of study in these colleges. (146) Position of teachers in such colleges, and (147) of students; (148) control and supervision of these colleges. (149) Why this mode of dealing with them has been chosen. (150—151) They must have an opportunity of improving.

*Section XIV. Presidency College.*—(152) Unique position of Presidency College. (153) Its resources ought to be made more generally available. (154—156) Proposals that the college should be incorporated in the University discussed and rejected. (157) The college must be more, not less, autonomous. (158—160) Proposed re constitution of the college. (161—164) Effect of these proposals upon the service system of recruitment and suggested changes in this system. (165) Advantages of these proposals. (167—169) Proposed 'Presidency Chairs' in the University. (169) To be filled by a special mode of appointment in England.

*Section XV. The need for new colleges.*—(170) The existing colleges insufficient. (171) New colleges necessary in Calcutta. (172) Small colleges with residential accommodation best. (173) But they ought to be near College Square; residences, etc. might be suburban. (174—175) Need of a Muslim college. (176) Its proposed method of organisation. (177) An orthodox Hindu college also suggested.

*Section XVI. The carrying out of the change.*—(178) Greatness of the changes proposed: they cannot be effected by mere enactment. (179) Appointment of an Executive Commission recommended, if it is decided to bring the new system into operation at once. (180) But there is much to be said in favour of delaying legislative action until the intermediate colleges have been established.

## CHAPTER XXXV.—THE MUFASSAL COLLEGES.

*Section I. Effects of our general plan of reform upon mufassal colleges.*—(1) Our proposals may arouse misgivings in mufassal colleges. (2) Hitherto the attraction of Calcutta has been partly checked by the uniformity of the affiliating system. (3) But new standards of value will bring about a change. (4) It would be disastrous if the mufassal centres were deserted owing to the attractions of Calcutta and Dacca. (5—6) To avert this, there must be reorganisation in the mufassal also. (7—9) Effects of the proposed 'intermediate' policy on mufassal colleges. (10—12) Probable future development of mufassal colleges.

*Section II. Survey of the problem.*—(13) Views of our correspondents on the desirability of establishing further universities in Bengal. (14—15) Opinions adverse to such a development discussed. (16) Proposals for the establishment of universities: 29 places mentioned. (17) It is impossible (apart from Dacca) to fix with certainty upon any place which ought to develop into a university. (18—22) Discussion of the desirability of providing means for determining such places.

*Section III. Proposal to establish a University of Bengal.*—(23) Reasons for the proposal. (24) Various forms of the scheme. (25) The proposal to create a University of Bengal, (26—28) which would place obstacles in the way of healthy

development, (29) is repudiated by the mufassal colleges themselves. (30) Concentration of resources for university training in selected centres is necessary. (31—32) A special organisation to carry out the programme. Our proposal for a Board of Mufassal Colleges, (33) as a temporary measure leading up to and preparing a better and more satisfactory solution.

*Section IV. A Mufassal Board attached to the University of Calcutta.*—(34) Suggestion that colleges in Eastern Bengal should be affiliated to Dacca discarded. (35) All mufassal colleges should be attached to Calcutta, but in such a way as not to hamper the Teaching University. (36) A board representative of all mufassal colleges proposed. (37) It should not meet often. (38—41) How far uniformity of courses and examinations is desirable.

*Section V. Control and regulation of mufassal colleges.*—(42) The Executive Council to determine questions of recognition or affiliation. (43) Conditions of affiliation and inspection of colleges. (44) Financial proposals.

*Section VI. University colleges or potential universities.*—(45) Importance of finding means of selecting them. (46—47) Conditions for recognition of university colleges. (48) A special panel of the Mufassal Board to be established for university colleges. (49—51) The effect of these provisions is to give to potential universities a growing degree of academic autonomy.

*Section VII. Burma.*—(52) Inconvenience of the present arrangement: a University of Burma needed. (53) Analogy between the conditions in Rangoon and those in Dacca. (54) If the foundation of the University is delayed, our proposals may provide a useful transition.

*Section VIII. Assam.*—(55—56) The university problem in Assam. (57—58) The contrast between Gauhati and Sylhet. (59) Gauhati ought ultimately to be the seat of a university. (60—61) But it is not yet ready for it, and needs a transitional stage.

## CHAPTER XXXVI.—THE EDUCATION OF WOMEN.

*Section I. Introductory.*—(1) Advance dependent upon public opinion. Views of His Excellency the Viceroy. (2) Special modes of treatment needed. (3) The two needs—*zanana* women and professional women.

*Section II. The education of *zanana* women.*—(4) Need for a new type of secondary school for this purpose, and (5) a special body to advise the Board of Secondary and Intermediate Education regarding it, and (6) a special type of examination. (7) Large expenditure required. (8) Also an adequate staff of teachers. (9) For this reason the education of *zanana* women is dependent upon the education of professional women.

*Section III. Non-purdah education.*—(10) Schools and colleges of the existing type required but changes are necessary. (11) Variations from the school course provided for boys desirable. (12) Intermediate education for girls should continue to be carried on in conjunction with degree work: reasons for this. (13) Need for training in teaching at the intermediate stage; (14) also for preliminary scientific training leading to the medical profession. (15) Need of co-operation among the women's colleges, and (16) of variations in the degree course for women. (17) Therefore a university Board of Women's Education is proposed. (18) Need for an expansion of professional training for women. (19) Every possible method of producing trained teachers should be simultaneously employed. (20) Training of teachers who do not go to colleges.

- (21) Women teachers to conduct this training must be imported. (22) The difficulties of medical training for women. (23) Proposed changes.
- Section IV. Conclusion.*—(24) No scheme of reform will lead to any good results unless it is supported by public opinion.

## CHAPTER XXXVII.—THE CONSTITUTION OF THE UNIVERSITY OF CALCUTTA.

- Section I. Preliminary survey.*—(1) The deficiencies of the existing system (2) make it especially unsuited to the needs of the proposed reconstruction. (3) Requirements of the new system. (4) A complete departure from the existing organisation proposed. (5) New relations with Government. (6) A large Court with a Committee of Reference. (7) A small Executive Council. (8) An Academic Council with Faculties and Boards of Studies. (9) A Mufassal Board. (10) A Board of Women's Education and other Boards and Standing Committees. (11) The Board of Secondary and Intermediate Education and provisional arrangements.
- Section II. University legislation.*—(12) Undue rigidity of the present system. (13) Four grades of legislation proposed. (14) (i) The Act of the Legislature: (15) (ii) Statutes; (16) (iii) Ordinances; (17) (iv) Regulations.
- Section III. The Visitor of the University*—(18.)
- Section IV. The Officers of the University.*—Introductory. (19) The Chancellor; (20) The Vice-Chancellor; (21) The Treasurer; (22) The Registrar; (23) The Superintendent of Examinations; (24) The Librarian.
- Section V. The Court of the University.*—(25) Ought to be widely representative, and should include (26) (A) *ex-officio* members; (27) (B) members in their own right; (28) (C) representative non-academic members; (29) (D) academic representatives; (30) (E) nominated members. (31—36) Functions of the Court. (37) A Committee of Reference. (38) Value of the Court.
- Section VI. The Executive Council.*—(39) A small administrative body needed; (40) primarily for financial purposes; (41) and for the direction of policy. (42) Constitution of the Executive Council. (43) A smaller Executive Commission proposed for the period of reconstruction. (44) The Chairmanship of the Executive Council. (45) Its legislative powers. (46) Qualifications of its financial powers. (47) Appointments.
- Section VII. The Academic Council.*—(48) A new feature in Indian university organisation. (49) Its appropriate size. (50) How to be defined. (51) Constitution of the Academic Council. (52) Some notes on these proposals. (53) Necessity for a Provisional Academic Council during the period of reconstruction. (54) The powers of the Academic Council: (55) (a) in regard to teaching work in Calcutta; (56) (b) in regard to other aspects of university work; (57) Its importance and value.
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## CHAPTER XXXVIII.—THE SITE OF THE UNIVERSITY.

*Section I. The proposal to remove the University.*—(1) The difficulty of Calcutta in some degree common to all city universities. (2) Difficulty of finding an adequate suburban site. (3) The proposal affected by our recommendations. (4) Withdrawal of intermediate students. (5) Other proposals may help to ease the situation, (6) as also the University of Dacca. (7) On the other hand our proposals would in some ways increase the difficulty. (8) The system of inter-collegiate work requires concentration of colleges. (9) Removal might help this. (10) The advantage of health is not all on the side of a suburban site. (11—12) Removal would cut off the University from the city, which would be unfortunate in several respects. (13) It is improbable that all colleges would consent to removal. (14) Many students now living at home would be unable to attend; and new colleges would arise for them, reproducing the existing situation. (15—16) On the whole, a complete removal impracticable.

*Section II. Proposals for the future.*—(17) Need for systematic consideration of site problems for educational institutions. (18) Sites for intermediate colleges and schools. (19) College Square should continue to be the centre of university teaching and administration. (20) Residential accommodation should be arranged for in suburban sites. (21) Summary of recommendations.

## CHAPTER XXXIX.—IMPROVED CONDITIONS OF STUDENT LIFE.

*Section I. Urgency of the problem: principles upon which a solution should be based.*—(1) Drastic reform of the conditions of student life is essential especially in Calcutta, (2) but the establishment of intermediate colleges should reduce the congestion in Calcutta. (3—5) General principles of future policy.

*Section II. Provision of residences for students in Calcutta.*—(6) Much money will be required, (7—9) but it is impossible to give estimates. (10) The collegiate hostel is the best form of residence, (11—12) but new hostels (collegiate and non-collegiate) should preferably be built in the suburbs. (13—15) Collegiate messes, provided that the houses can be engaged on long leases, should also be utilised. (16—17) The Executive Council of the University should frame general regulations, assist the colleges in acquiring houses and in supervising

building plans, and submit estimates to Government in accordance with a well-considered plan of development. (18) The University Institute might serve as a central club-house for those students residing in the suburbs.

*Section III. Provision of students' residences in the mufassal.*—(19—21) The problem of the mufassal is mainly the provision of hostels. (22) The prevalence of malaria, and (23) the availability of suitable sites in the several centres, (24—27) should be taken into account by a special committee of the Board of Mufassal Colleges and by the Executive Council.

*Section IV. Superintendence and internal organisation of hostels and attached messes in Calcutta and in the mufassal.*—(28—31) The provision of common-rooms, libraries, sick rooms and prayer rooms. (32) The purchase of stores by co-operative societies. (33—35) The supervision of students' residence should be easier under the new conditions proposed.

*Section V. Health of students. Proposed University Board of Students' Welfare.*—(36—37) The Board of Students' Welfare: (38) its composition, and (39—44) functions.

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*Section VII. Other factors in the problem.*—(56—58) The poverty of many of the students, (59—61) the narrow choice of careers, and (62) the fermentation of new political and social ideals are causes of the present unrest. (63) The need for patience and hopefulness: the opinions of Mr. Gokhale. (64—66) The success of any system of education therefore depends largely upon the conditions which are themselves remote from education.





## CHAPTER XXX.

### THE NEED FOR A NEW DEPARTURE.

#### I.

1. We have now completed our review of the present state of higher education in Bengal and of the social conditions which affect its welfare. In the preceding chapters, we have sketched in outline the development of the western system of education from its beginnings in this Presidency a little more than one hundred years ago ; the swiftly extending influence of the new ideas which it conveyed ; their disintegrating impact upon many ancient traditions and customary ways of life ; the stimulus which those new ideas have given, the tension which they have caused ; the political and economic situation, in some respects full of encouragement, in others of menace, to which they have led. We have seen what part has been taken by Government, what by private effort, in the furtherance of this educational revolution ; the temperament, the aptitudes and the needs of the young people who are affected by it ; the growing pressure of the demand for the new opportunities which it offers—a demand which, first springing from the Hindu educated classes, has in recent years proceeded with no less intensity from the Musalmans and is now beginning to show itself even among the more backward classes of the community. We have described, as the most powerful single factor in this momentous change, the rise of the University of Calcutta from its foundation in 1857 ; the part which it has borne in the diffusion of western culture, and recently in the encouragement of oriental learning ; its still slender connexion with the educational system of the domiciled community ; the activities in which it and its affiliated colleges are now engaged and the defects inherent in the method of instruction usually employed ; the relations of the University to secondary education both for boys and girls ; the problems which confront it in providing higher education for women ; the faulty conditions of its student life, especially in Calcutta ; its system of examinations and their overshadowing importance ; its provision of professional training for the lawyer, the medical man and the

engineer ; its plans for providing courses of instruction in agriculture, technology and commerce, and the bearing of those plans upon what has already been attempted in these branches of education. We have also described the constitution of the University and its administrative organisation ; its connexions with the Governments of India and Bengal ; the efforts which it has made in recent years to avail itself of the services of scholars coming from other parts of India and from Europe ; its relations with other sister universities in India and overseas.

2. But our attention has not been confined to the University of Calcutta. Bengal having been promised a second university, we have borne in mind the effect which the establishment of the University of Dacca must have upon the existing conditions of higher education. And, though we have deferred our discussion of the plans proposed for the new University to the second part of our report, we have kept in view the influence exerted upon educational thought in the Presidency by the Dacca University Committee's report published in 1912 and by new developments of university work in other parts of India, especially at Benares, in Bihar and Orissa, and in Mysore.

3. Furthermore—to complete this survey of the contents of the preceding chapters—we have given an account of the present situation of the traditional systems of oriental studies in Bengal and have endeavoured to find new points of contact between them and the University. We have also reviewed and discussed the present practice as regards the medium of instruction and examination ; and have mapped out the main currents of opinion as to the respective claims of the mother tongue and of English to predominance in the successive stages of secondary and higher education under existing conditions in Bengal.

4. The first part of our report is based upon what we ourselves have seen in the different parts of the Presidency ; upon the oral and statistical evidence which we have received, and upon the written replies given in answer to our *questionnaire*.<sup>1</sup> For these replies we are indebted to more than four hundred correspondents, most of whom write with intimate knowledge of the social conditions prevailing in the Presidency and of the way in which its educational system actually works. What they have written dis

<sup>1</sup> See Chapter I.

closes the service which the schools and colleges have rendered to the country, the new opportunities now opening before education in Bengal, the grave defects which impede its progress, and the dangers which threaten its future welfare. We desire to express our obligation to our witnesses and correspondents, and especially to those who have furnished us with a written expression of their views. In the careful study which we have given to these documents, we have been impressed by the individuality and personal reflection which distinguish a large proportion of them, and by the candour with which the writers, while deeply convinced of benefits which education has brought to Bengal and of the importance of extending its influence, criticise its present shortcomings and defects. We hope that what our correspondents have written may prove to be the beginning of a new movement of educational opinion in the Presidency. Their replies record the thought and feeling of the educated classes in the community upon a question of supreme importance at a turning point in the history of India and of the Empire.

## II.

5. The most striking feature of the situation is the eager demand for secondary and college education, in which English is the medium of instruction. Bengal has always shown a strong predisposition towards western learning. The volume and intensity of the present demand are however beyond precedent. The number of students enrolled in the 'arts' colleges in Bengal increased from 10,980 in 1912 to 18,478 in 1917. This is an increase of 68 *per cent.* Within the same short time, the number of pupils in the English secondary schools increased by more than 40 *per cent.* Nearly 400,000 students were receiving English secondary and college education in 1917 as compared with 278,000 in 1912. There is no parallel to these numbers in any other part of India.

6. It is clear that a powerful movement finds expression in this demand for secondary and college education. Four causes have produced it. The first is the economic pressure which is straitening, in some cases to the point of penury, the already narrow means of many families belonging to the respectable classes in Bengal. Prices are rising. A higher standard of personal expenditure becomes almost inevitable, especially in Calcutta and, through the influence of life in Calcutta, elsewhere. Thus a considerable sec-

tion of the community, and one which by reason of its intelligence is influential out of proportion to its numbers; is impelled by increasing claims upon the family income to seek for all its sons the education which alone gives access to the callings regarded as suitable for their choice. The sacrifices made by these families and by the boys themselves in order to get education are severe and silently borne. Higher education in Bengal is being bought at the price of self-denial and, in many cases, of actual hunger. To the members of the respectable classes English high schools are a social necessity. They are desperately anxious that their boys should be able to get at the lowest possible cost the kind of education which will help them to livelihood in a career consonant with their sense of dignity and with what are felt to be the claims of their social position.

7. The second cause which has led to the increased demand for secondary and higher education is the awakening of new ambitions in ranks of society which formerly lay outside its range. The social recognition to which a graduate is entitled is naturally prized by many whose rising prosperity enables them to look higher than their earlier circumstances allowed. Agriculturists, in thinking of their sons' future, look beyond the horizon of village life. The difficulty of finding remunerative employment on the land for all the young men of a large family makes their fathers wish to put them into other callings, access to which is through the English secondary schools. This stream of new comers from the country districts swells the numbers in the existing high schools, floods some of them beyond their capacity and creates a demand for new accommodation. Nor does the flood seem to have reached its height. Other tributary streams increase the demand for schools. From classes in the Hindu community which are still illiterate, clever boys are making their way upwards into higher education. There are few signs at present of any desire to break loose from the too bookish curriculum. There is little disposition to adventure upon new and unfamiliar careers. But though not yet on the American scale, the movement towards the high schools in Bengal shows something of the American faith in the social value of educational opportunity.

8. The third cause which has stimulated the desire for secondary education in Bengal is hardly less powerful. It is the feeling, however inarticulate and undefined, that economic and social

changes are near at hand. There is an instinct that India will become a more industrial country, that new kinds of employment will be opening, and that it will be to a young man's advantage to have had a good education. In what way or to what extent these anticipations may be realised, no one is able to predict; but the general impression that such changes are possible has in itself an effect. In other countries such a stir of new educational ambitions has always been a sign that the old order of social ideas is shaken, that fresh and unaccustomed forces are coming into play, and that some great re-adjustment of economic conditions is not remote. We cannot point to any educational movement upon the scale of that now visible in Bengal which has not been the overture to a period of social tension and of far-reaching change.

9. A fourth cause has furthered the growth of secondary and college education during recent years. Thoughtful Indian opinion frets under the stigma of illiteracy which, in spite of the high attainments of a relatively small minority, the country has still to bear. Every advance which India makes towards a place of direct influence in the affairs of the Empire throws into sharper relief the ignorance-under which the masses of her people labour. The educated classes are sensitive to this blot upon the good name of their country and feel that it lowers the prestige of India in the eyes of the world. They approve therefore of any extension of education, believing that an increase in the numbers of any kind of school will directly or indirectly lessen the mass of ignorance which is the heaviest drag upon the progress of India. On a narrow view of their own interests the educated classes might demur to making higher education accessible to scores of thousands of new aspirants to careers which are limited in number and already overcrowded. It is well understood that one result of the growth of new high schools will be to intensify the competition for a restricted number of posts and therefore to prevent salaries from rising. But any disposition to limit educational opportunities on this account is overborne by a conviction that the country needs more education, and by a faith that the liberal encouragement of new schools will in the long run prove the wisest policy. Such encouragement is believed to be in the interests even of those who already enjoy access to the kind of education which, if it were limited to them, would have an enhanced pecuniary value. Much of the zeal for

secondary education springs from non-self-regarding motives and works against what might appear to be self-interest. It is this belief in education for its own sake, a belief which—though often vague and indiscriminating, is ardent and sincere—that gives its chief significance to the movement now spreading in Bengal.

10. But the forces which are driving forward this new movement of opinion will not by themselves raise the level of excellence in education. On the contrary, unless they be supported by financial assistance and directed wisely to well-chosen ends, they will bring about a collapse in an old system which was designed for more limited numbers and for the needs of earlier days. The existing mechanism is overstrained by the unexpected pressure of new demands. Year by year it is less able to cope with them. At present, nearly every one who goes to school or college gets something short of what he really needs. In many cases the sons of the older educated families are receiving an education of a quality inferior (at any rate inferior in proportion to present necessities) to that which their fathers enjoyed. The new-comers are not getting the kind of education which they require but a diluted share of something designed for other conditions and defective in its adjustment to existing needs.

11. If rightly directed, however, the forces which are at work in the new movement are powerful enough to transform education in Bengal and to make every school and college better than it has ever been. But the energy which the new movement supplies needs to be concentrated at the right points if it is to lift the heavy mass of the present system to a higher level. It can only be so concentrated by a representative (we do not mean by this a directly elected) central authority commanding the confidence and support of public opinion. The energy which has to be collected and applied shows itself for the most part in private aspirations and in family aims. Family opinion therefore and individual minds will have to be convinced that the new plan is better than the old plan. Nothing can be done unless the new arrangement is plainly better than what now exists and is more likely to satisfy personal needs. It must give more, and give it more profusely. At the same time, what it gives must be of far better quality and more closely adapted to the different grades of capacity found among those who receive it. It must be liberal in aim, and yet must serve practical purposes. It must be so widespread that no one is shut out, and

yet be selective in the sense of giving to each individual the training which will meet his needs. It must have public authority behind it, and yet must allow scope for private initiative and have regard to diversity of local needs. Yet, even if all this can be done, many will oppose change, through not realising the gravity of the situation or through being wedded to the established order of things. To overcome this inertia a concentration of the available energy will be required. A wave of public opinion, supporting the action of a new representative central authority, can alone raise the present system to a new level of usefulness and open out new educational opportunities.

12. We sympathise very strongly with the view that one of the greatest needs of India is more education, widely spread throughout the community. At the base of the system should be well-staffed primary schools, bringing a new stimulus to the mass of the population by means of a training liberal in spirit and yet adapted to the conditions under which the vast majority of the pupils must afterwards seek a livelihood. In order that every child of special promise may enjoy further opportunity, the primary schools should be linked up to secondary education in its various grades. The teaching in the secondary schools should be carefully adapted to the requirements of different types of ability; emphasising the value of an all-round development of physique, mind and character and not forgetful of the practical needs of modern life. The system should be crowned by universities, professional schools and technological institutions, popular in their sympathies, exacting in their standards, many-sided in their courses of study, staffed by able teachers, and accessible to all who may have shown themselves competent to profit by advantages necessarily costly to the State. We share the opinion that, just as the main economic purpose of the co-operative movement is to democratise credit, a chief aim of the educational institutions of India should be to democratise knowledge.<sup>1</sup> But in order to meet the needs of the whole people, education must be organised with infinite care; it must be developed by patient experiment, by public and private expenditure on a generous scale, and with rigorous regard for excellence in quality; it must be adjusted and continually

<sup>1</sup> See article by Mr. Lalubhai Sanaldas 'on Problems of Reconstruction' in *The Social Service Quarterly* (Bombay), July 1918.

readjusted to the manifold needs of different individuals, and to the needs of the community for the service of which the individual is trained. Thirty years ago, when the Commissioners on Technical Instruction went from England to various parts of Europe in order to learn what was being done to strengthen the economic position of different countries by means of education, a Swiss gentleman said to them: "We know that the mass of our people must be poor; we are determined that they shall not also be ignorant." By waging war against ignorance, the Swiss have alleviated poverty as well. But they have succeeded in doing so only by thinking out at each stage what education should aim at, what kind of teaching it should provide, and how it may combine training for livelihood with training for life. And the fundamental need which the Swiss have set themselves to meet is the need for teachers trained for this profession and inspired by public and patriotic aims.

13. But, as things are, the most serious weakness in the educational system of Bengal is the dearth of teachers competent to give the training which, in order to meet the needs of the community, the schools and colleges should provide. As compared with many other countries, Bengal is very weakly furnished with the *personnel* indispensable to educational success. Until this defect is remedied, the hope of achieving a great advance must be foiled. There are two reasons for the weakness. First, social conditions deprive Bengal, at present almost entirely, of the services of women teachers, who, in other lands touched by like aspirations, form the great majority of the teaching staffs in primary education and are employed in rapidly growing numbers in secondary schools. Secondly, so poor are the salaries and prospects offered to teachers and so doubtful is the status of the teaching profession as a whole, that the calling fails to attract the necessary number of recruits possessing the ability and training which are required for the work of public education. In Bengal the widespread faith in education is in violent contrast to the disregard of the instrument by which alone education can achieve its aims.

14. At present all the young men who have been trained at high schools and colleges seem to find posts of one kind or another. It is true that increasing competition keeps salaries low. Relatively to the higher cost of living, incomes actually decline. It is often the practice to wait a long time for a settled appointment of the

kind which the applicant thinks is worth his while to accept. But, apart from congestion in the legal profession, we have found few signs of actual unemployment among the young men of the educated classes. No prominence is given to unemployment in the answers to our *questionnaire*. The matter was not mentioned to us in oral evidence during our visits to different parts of Bengal. The output of higher education is still absorbed by the Government service, by the professions and by the commercial firms, though the rates of payment are often meagre and there is a general complaint that the economic position of the educated classes as a whole is increasingly painful and discouraging. Nevertheless we cannot but fear that, unless there are great developments of industry and commerce in Bengal, and unless the educational system is adapted to the new requirements, the supply of young men trained by the high schools and colleges will be found at no distant time to have overshot the demand. This fear is shared by many observers, Indian and European alike. In spite of this anxiety, however, there is a strong feeling that, so far from being kept stationary or from being curtailed, opportunities of secondary and higher education should be more widely diffused.

15. Thus, year by year the high schools and colleges send out into the world young men in numbers so great and so rapidly growing that the prospects in the callings which they choose are already impaired and are likely to become seriously worse. At the same time a great calling, indispensable to the community and not in itself derogatory to the dignity of the most highly educated men, is in urgent need of the services which well-educated men alone can render. The belief that education can give new life to Bengal grows apace. With the help of a large body of able and vigorous teachers it could meet all the hopes which are reposed in it. But these teachers are not yet forthcoming. The prospects afforded by the teaching profession are insufficiently attractive. Yet there is a multitude of promising young men who would be glad to find a calling adequately remunerated and capable of satisfying the ambitions of those of them who desire to serve their country and their generation. Is it possible to bring these two needs together, and thus at one and the same time to furnish Bengal with the instrument which will realise its educational hopes and to open out for young and well-educated men attractive opportunities in a profes-

sion from which they now turn aside? We conceive that this might be done, but only by drastic improvements in the present system.

### III.

16. Such is the general situation disclosed in the earlier chapters of this report. We shall now recapitulate the most conspicuous defects in the existing educational system before proceeding to make detailed recommendations for its reform.

17. In the first place, the colleges have to deal with large numbers of students insufficiently prepared for the methods and standards of university work. A considerable proportion of the candidates who pass the matriculation and enter college are not ready for university teaching. In order to take advantage of what the University can offer, they should have a more thorough command of English, should possess a wider range of general knowledge, and should be maturer in character and judgment. The intermediate classes do not rightly belong to the university stage. They are preparatory to it, and in a more fully organised system would find their place in the sphere of higher secondary education.

18. The remedy will be found in a thorough-going reform of secondary and higher education in Bengal. Our evidence shows that this is the most urgent need. The schools should have a wider curriculum, a larger proportion of trained teachers and improved equipment. Many parents who are making bitter sacrifices in order to give a high school education to their sons get a very poor return for their self-denial. The schools specialise in preparing boys for the university matriculation. It is easy to excuse them when we remember what public opinion insists upon their doing, and how careful most of them have to be in keeping public opinion their friend. But the college authorities find no reason to be satisfied with the average result. On the contrary they say that the intake from the schools is of such poor quality that little can be made of it without a long preliminary drill. It is not that the material is bad but that it has been mishandled in the schools. This in itself would be serious enough, but the mischief does not stop here. The high school training which fails to fit most of the boys for the University, fails also in fitting them for anything else. Preoccupied with the matriculation, the schools neglect the rest of their business. The teachers who are giving their lives to high school work have a strong claim

upon public consideration and support. A comprehensive reform of secondary education would make their work more fruitful, would bring to their assistance competent and well-trained colleagues, would strengthen the University and would add to the vigour and practical capacity available for every kind of public and private service in Bengal.

19. A better secondary education would give to the workshops and factories of the future the responsible leaders which they will require. An experienced Indian witness tells us that one of the things which would most relieve the situation is a breakdown of the prejudice against working with the hands. Such a change would be promoted by a good modern course of secondary education in which the training of the hand and the study of science have an important place without detriment to the training given through language, literature and history. Books would mean more to high school boys in Bengal if the high schools were less bookish. Not only industry and commerce but the professions would be better served by schools which had a broader outlook and gave a more varied preparation for life.

20. In the second place, the University and its colleges fail under present conditions to give the abler students the educational opportunities which they deserve. The first question which we put to our correspondents asked whether the existing system of university education affords to young Indians of ability full opportunity of obtaining the highest training. An overwhelming majority replied in the negative.<sup>1</sup> Too little is done in the way of providing the special teaching and tutorial advice which a student of promise needs from the beginning of his course. In the undergraduate course in arts (laboratory instruction gives more opportunities for individual guidance in science) there is only one type of education for all students alike. Honours men and pass men attend the same lectures. This arrangement does not discriminate between the needs of different qualities of mind. The more promising students are kept back by the less intelligent. In the undergraduate classes too little is done for the boy of parts.

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<sup>1</sup> The question was answered by 284 correspondents, five out of every six being Indians. The number of replies unfavourable to the present system of university education, on the ground of its failure to meet the needs of students of ability, is 243. The other answers show for the most part only a qualified acquiescence in the existing arrangements, many expressing a desire that they should be greatly improved.

21. The remedy for this defect will be found in a remodelling of the university regulations which should institute honours courses distinct from those which lead up to a pass degree. But in order that they may provide the teaching and tutorial guidance which the abler students require, the colleges should be helped to increase and strengthen their staffs and in Calcutta there should be closer co-operation between the colleges and the University. The teachers should have more responsibility in planning the courses of study, and the University should have greater freedom in framing and changing its regulations.

22. In the third place, the physical side of education receives too little attention both in colleges and schools. The health of the students is unduly neglected. Facilities for games and physical training are inadequate. Great numbers of the college students and of school boys live in unsuitable houses where the conditions are very unfavourable to health. Secondary and higher education in Bengal would be a much greater boon to the community if improvements were made in those conditions of student life.

23. If the attention of the University and school authorities is directed systematically to the removal of these defects in physical education, much may be done at comparatively small expense. But the provision of well-arranged hostels for school boys and college students will entail great expenditure, especially in Calcutta, and must be undertaken upon a carefully considered plan by Government in co-operation with the universities and with the governing bodies of colleges and schools.

24. Obsession by the idea of passing examinations is another glaring defect in the existing system of university education. A degree has such value as a qualification for appointment to a post in Government service that, under the pressure of their poverty, the great majority of the students forget the wider purposes of university training and concentrate their thoughts upon the certificates which it confers. No one who tries to put himself into the position of a struggling Indian student, and to realise what he himself would probably do under like conditions, can wonder at the dominating place which examinations take in the student's outlook or at the anxiety with which he looks forward to them. They are the touchstone of the young man's career. His prospects in life depend on them. And he knows what sacrifices his parents have

made in order that he may win a degree. But, though the excessive importance which is now attached to the results of the university examinations is natural enough, the effects of it upon the spirit and tone of university life and studies are lamentable. University education in Bengal (and similar complaints come from other parts of India) is largely vitiated by this narrowness of aim.

25. Of course, from the time of its first introduction into Bengal, western education has owed part of its attraction to the fact that it qualifies those who receive it for posts in which a knowledge of English and of western ways of thought is indispensable. Similarly in every other country one of the reasons which brings students to the university is the desire to obtain a qualification which will help them in their careers. But what is noticeable in India is the disproportionate degree in which this motive influences the majority of students throughout their university course. It seems to overshadow all other considerations, and to close the mind to many of the wider interests of university life. In former days, when western ideas were fresh to India, students felt more enthusiasm on being brought into contact with European thought and literature in the course of their work for a university degree. The reading of English books, the words of European teachers, kindled their minds and gave them a new outlook on life. Thus the most important side of their university training was that in which self-interest was forgotten, although the students were fully aware of the money value of a western education as helping them to gain a post or to win success in a profession. The course of study had in itself a cultivating power because those who followed it were eager to absorb the ideas which it conveyed. This is still true in many cases. There are great numbers of students in Bengal, as elsewhere in India, to whom European literature and science bring the revelation of a new world of thought and criticism. But there is no longer the same wonder of novelty. Through books and newspapers, and often through talk heard at home, they have already become familiar with many of the ideas which, in the earlier days of western education in India, were first encountered in the college course. Hence the university curriculum, though it has been widened and improved, stirs the imagination of the modern student much less powerfully than it stirred the imagination of his predecessors in the earlier days of the new movement. There is need for a readjustment both of the subject-matter and of the methods of

university teaching to the new situation which has gradually arisen. A kind of teaching and a range of studies which served a very useful purpose in former days have become in great measure sterilised by routine. What at one time was purposeful and efficacious, because the students themselves were eager for it for its own sake and believed in its efficacy, has through lapse of time and through familiarity lost much of its interest and power of inspiration.

26. This is a point of capital importance to the wider implications of which many of our witnesses refer. We select therefore three passages from the evidence for quotation here. Rai Lalit-mohan Chatterjee Bahadur writes<sup>1</sup> :—

"The education imparted does not go deep enough for shaping mind and character. The student comes up from the school with a vicious habit ingrained in him—that of depending chiefly on his memory.....The student depends even more largely on bazar notes and keys because he has never acquired the power of accurate expression or of thinking for himself. The teaching that he receives is mainly, if not exclusively, directed to helping him to pass his examination. He brings with him so poor a basis of sound general education that higher teaching is more or less wasted on him. Then again, there is very little in his studies in the college to awaken living interest or touch his deepest instincts—and so call forth mental effort. For example, the political and social evolution in India is the most vital concern of young India ; modern university studies have little bearing on that."

Mr. J. C. Coyajee of Presidency College urges<sup>2</sup> that—

"the unpractical.....ideals of our education have caused a great deal of harm.....Literary studies form the main body of the system, while tags and fringes of scientific, technical and commercial education have been attached to it by an after-thought as it were. The injury caused by this state of things is grave. It is clear even to the students that such education is of an unpractical nature, and leads to nowhere. The enthusiasm of the student is damped by seeing the comparative fruitlessness of the work at which he is toiling.....Our educational system should have as its distinguishing feature the ideal of practicability.....Our education should be many-sided so as to cater to the variety of the talents and needs of the alumni. A great change is at present coming over the educational system and ideals in England, and the present opportunity should be taken to transplant some of these new ideas here."

The need for a great change in the temper and outlook of university studies is admirably stated by Mr. Justice Abdur Rahim who writes<sup>3</sup> :—

"The present system has undoubtedly done valuable service in the past, but it is clear that for some time it has been out of touch with the requirements

<sup>1</sup> Question 1.

<sup>2</sup> General Memoranda, page 416.

<sup>3</sup> *Ibid.*, pages 434-435.

of modern life. Obviously, a system of university education, which results in the training that is given being dissociated from, or found inadequate to meet, the needs of life understood in a comprehensive sense, has to be discarded or so moulded as to enable it to serve its proper purpose. The scope of the Indian universities is extremely narrow, and it can hardly even be said that they pursue any conscious definite aim. An up-to-date university should press into its service all that there is in literatures, sciences and arts and in life calculated to develop the student's power of thought and action, his ability to co-operate and to organise, so that he may add to the intellectual, moral and material resources of his country and the world, and be a true leader of his people. University education can have little value if it does not succeed in liberating the student's mind and moral nature from the narrow traditions of the past and the harmful prejudices of his surroundings, and in fully developing in him the sense of social justice and responsibility, or if it does not instil in him the courage to live a full life and to enable those around him to live such a life. The aim of an Indian university should be to create an academic atmosphere in harmony with the above ideal.

For the Indian student 'the dim shades of the cloisters' are not so much needed as the inspiration of the workshop and the factory; above all he should be made to realise, with the energy of faith, the teaching of science and experience that the miseries, sordidness and inefficiency that surround him are not inevitable but are mainly the product of social misarrangements capable of being set right.....The fact must also be frankly recognised that there will be no sense of reality about any scheme of university education so long as the opportunities of civic life are not in harmony with it. We must proceed in the hope that such harmony will be established and that the labour of this Commission will be co-ordinated with the contemplated political and industrial reorganisation. The conditions of the times make it clear that it will be for the good not only of humanity but the British Empire itself that the talent and moral energy of the people of India should be fully developed and utilised in the future ordering of human life along more stable, comprehensive and harmonious lines."

27. Thus by imperceptible degrees and from causes which have lain beyond the control of the universities, the older course of studies has lost much of its savour. And when we remember the extraordinarily rapid increase in the number of college students— an increase which has resulted in its being the lot of the majority to be herded in large classes, to be treated as a crowd and to be passed on from one stage of instruction to the next almost like materials through a machine—and that an ever increasing proportion of the students come from poverty-stricken homes and many of them from families which have no long tradition of higher education, we can hardly wonder at the exaggerated importance which it has become the custom to attach to success in passing examinations as giving value for the money spent in school and college fees. Lamentable as is the present state of affairs, there are many reasons

which forbid a harsh judgment upon it. One of our correspondents<sup>1</sup> refers in the following passage to the difficulties with which many of the students have to contend:—

“The most serious handicap of the Indian student is the intellectual atmosphere which he has to breathe. I need not say that no disparagement of the Indian intellect is implied in this statement. What I refer to is simply the outcome of well recognised sociological conditions peculiar to India and more especially to India in the mufassal, at this stage of her progress: (i) There is the great mass of illiteracy all round. I am not speaking here of illiteracy in the student's own immediate circle of relations and friends, but of the illiteracy among those whom personally he may not know at all. It would be interesting to trace out some of the subtle pervasive ways in which this great mass of illiteracy is operative as an influence not only on the student (though he perhaps is most affected) but also to a greater or less extent upon all who have to live and work in India.....The general effect is a sort of aridity or sterility which is not favourable to normal many-sided intellectual growth. (ii) There is the fact that even when literacy is present it is usually a one-sided affair, hardly as yet affecting women to any appreciable degree. (iii) Only too frequently is the student an isolated unit in his family, in his social circle or, it may be, even in his neighbourhood.”

28. A chief purpose of the recommendations made in the following chapters is to suggest remedies for the narrowness of the student's outlook which is one of the most depressing features of the existing system of school and college training. We do not disguise from ourselves the difficulty and extreme complexity of the problem. It springs in part from the social and economic situation of the country. It is also due in great measure to poverty—to the poverty of individual students and to the fact that most of the educational institutions have insufficient funds at their command. But much of the evil is due to remediable defects in the organisation of the universities and to a bad tradition which may be transformed. And it is clear that the way in which the universities have been used for the purpose of recruiting the State services has had a demoralising effect and has induced among many of the students a spirit of routine, together with excessive anxiety about the results of examinations followed by embitterment and depression in the case of failure.

29. Conscious of the need for the better adjustment of university courses to the demands of industrial and commercial careers, a large number of our witnesses urge that the University should provide an increased number of courses of training in technology. This

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<sup>1</sup> Mr. M. B. Cameron in answer to Question 2.

powerful body of opinion shows that the time is ripe for a great extension in the activities of the University and for the establishment of closer relations with the leaders of commerce and industry. But it is not less clear that, before these hopes can be fully realised, there must be great reforms in the secondary schools and in the intermediate courses. Bengal needs a modernised secondary and higher secondary education in which science is indispensable. A great change is required in the intermediate stage. But the reform of the intermediate courses is bound up with the reorganisation and improvement of the secondary schools on the one hand, as well as with the reconstruction of the present university system on the other. Upon the evidence which we have received on this subject many of the recommendations made in the following chapters are based.

30. Even more fundamental is the need for a great reform in the methods of teaching both in schools and colleges. Upon this question the testimony of our witnesses is conclusive. The systematic training of those who intend to enter the teaching profession—a training which includes the study of the principles of education and thorough practice in the art of teaching a class—has changed the character of the educational system in many other countries. It is capable of rendering the same service to Bengal, provided that the prospects of the teaching profession are so improved as to attract a larger number of men of ability into this career. In the following chapters we make recommendations as to the part which Government, the University and public opinion may take in this reform.

31. For the work which awaits it in the advancement of learning and for the reform of its present methods of training, the University of Calcutta needs reconstruction and larger funds. The Senate has to serve as a representative assembly and at the same time to decide matters of detail appropriate to a small executive. It is neither large enough to reflect all the shades of relevant experience and opinion, nor small enough for the discussion of intricate affairs. The Syndicate is at once insufficiently representative, and too accidental in its composition to decide, with adequate knowledge of what they involve, all the problems which the insufficiently differentiated constitution of the University assigns to its care. We shall therefore propose the establishment of a teaching university in

Calcutta, based upon a new and closer association between a reconstituted university and reconstituted colleges. At Dacca, where the number of students will be smaller and the conditions of the problem simpler, we shall propose the establishment of a teaching university wherein the teaching will be directly and entirely under the control of the university authorities; and where, we hope, the close association of Hindu, Muslim and European teachers will in a specially high degree afford opportunities for collaboration in thought and scholarship among the representatives of the three cultures from the blending of which a new intellectual movement may arise in India. In the case of both universities we shall recommend that, in respect of the great bulk of ordinary academic business connected with teaching and courses of study, the direction of policy should be chiefly in the hands of the teaching body. We shall propose that such of the mufassal colleges as may provide courses for a degree should for the present remain in association with the University of Calcutta and be under its aegis and protection; but that they should do their work under new conditions which, while not hampering the growth of the teaching system in Calcutta or imperilling the standard of the degree, will give to all of them a due measure of academic freedom, and will afford to those which show potentiality of growth the opportunity of rising stage by stage to academic independence.

#### IV.

32. We are aware how much excellent work is being done not only by individuals but by institutions under the very unfavourable conditions which now prevail. We have observed in several directions the beginnings of a new life in the University and in some of the colleges, not least in the labours of the university professoriate and of many devoted college teachers, in the formation of councils for post-graduate study, in the improvement of scientific laboratories, in the rapid (though still inadequate) development of hostel life, in the growth of a sense of the obligation to social service, in the effective organisation of the university battalion, and in the increasing interest which is taken in questions of educational reform.

In circumstances of extraordinary difficulty, the University has achieved a great work. All over Bengal we found a grateful appreciation of its past service and a strong desire that it may be

so developed as to meet the rapidly changing and extending needs of the country. But we cannot conceal our apprehensions at the consequences which are likely to follow from a continuance of the conditions (statutory, administrative and financial) under which its work is now carried on. We believe that the evil effects of the present system are corroding the intelligence of young Bengal and that they will work increasing and irreparable mischief unless their causes are removed.

33. It is therefore our conviction that the reform of university and secondary education in the Presidency is a matter which does not safely admit of delay. India, with new political responsibilities, is coming into the fellowship of nations. Her education, from primary school to university, should be answerable to modern standards of what is best. Of late in Britain, in Western Europe, in Australia and in America there has been a widening of educational opportunity, an amendment of educational aims. A like change, made in a spirit which respects her own noblest traditions, is needed in India also. The ideals of a new age call insistently for a new purpose in education. India, for her own sake and for the sake of others, should bring her wisdom and experience to a task in which every nation is called to share.

34. In the eloquent and touching memorandum which he has submitted to us,<sup>1</sup> Mr. Ramendra Sunder Trivedi, Principal of Ripon College, draws a picture of education in ancient India and a contrast between its aims and those which have prevailed under the new influences coming from the West. He says that he is himself indebted for the most valued possession in his life to the benefit of western education received under the auspices of the University of Calcutta. He describes the University as 'a foreign plant belonging to a type which flourished on foreign soil.' But he holds that 'its importation was an urgent necessity of the time, suddenly created by the abrupt introduction of new conditions of life with a new order of political situation.' Those who introduced the new university system were constrained 'to plan out a machinery' but had not, in Mr. Trivedi's judgment, "the opportunity to think out whether it would organically blend with the life, spiritual and secular, of the people for whose benefit it was intended."

<sup>1</sup> General Memoranda, pages 303-309, see also the memorandum by Sir John Woodroffe in the same volume, pages 309-311.

### 35. Nevertheless he contends that—

“the University has not failed as an institution and as a machinery. It has admirably served the purpose for which it was primarily intended. It has given the State a body of faithful and able servants . . . What is more valuable still it has broadened the very base of life of an oriental people hitherto accustomed to move along the narrow lines and ways of their own, in the seclusion imposed upon them by their own history and geography. Western thought and western culture brought to us through the universities have widened our field of vision, have placed before us new duties, have created new aspirations, and to-day the land is astir with the promptings of a new life, struggling to participate in the eternal conflict of life in the world ; striving to bring forth a type of Indian humanity which, broadly and securely based upon the foundations of its own special culture, will assert itself in the presence of the manhood of the world.”

36. With this appreciation of the work which the University of Calcutta has accomplished and with this indication of what should be its future aims, we find ourselves in full accord. And we believe that the drastic changes which are proposed in the following chapters will enable those aims to be realised. We shall welcome those changes because they will give new life and freedom to the University as a place of learning and of education, and will allow its teachers to combine what was best in the ancient educational tradition of India with what is best in the educational aspirations of the West.

37. Mr. Trivedi, while eager to acknowledge the service rendered to India by western education, looks back wistfully at what has been lost by the inevitable decay of the older tradition :—

“Western education has given us much ; we have been great gainers ; but there has been a cost, a cost as regards culture, a cost as regards respect for self and reverence for others, a cost as regards the nobility and dignity of life.”

He deplores the fact that, by too many of the present generation of students who seek western education, ‘knowledge is valued because knowledge brings success in life—often success in a vulgar sense.’ He regrets the change in the relation between teacher and pupil, the weakening of the personal tie by which they should be bound to one another. He feels constrained to say that the true end of university education, the advancement of learning, has ‘receded to a distance and is half-forgotten in the striving for the maintenance of a suitable standard of test of fitness among the clamorous claimants for a degree.’ But it would be inaccurate to ascribe these changes in temper and outlook to the introduction of western education as such, though they have unfortunately



39. In the middle of the nineteenth century what was written about educational aims in England was far from being fully representative of English practice. The ideas most loudly expressed in educational propaganda were individualistic. At their best, they were inspired by a belief that the free play of individualities would lead almost automatically to social justice and well-being. At their worst, they were coloured by a vulgar commercialism. English opinion was far from being unanimous in its acceptance of these ideas. There were no better critics of what was crude and one-sided in them than Englishmen like Dickens and Ruskin.

40. But the circumstances of the time gave a disproportionate degree of importance to the individualistic and utilitarian theories of education which were being vigorously stated by influential speakers and writers in England. It is not surprising therefore that to many Indians the utilitarian side of western education appeared to be its characteristic feature. Other reasons deepened this impression. The close connexion between a university degree and admission to employment under Government emphasised the money value of the new education. The usefulness of being able to speak English caused many Indians to think of western education as being mainly a valuable kind of technical instruction, and as very different in its aim from the education which he had been accustomed to associate with the idea of religious training. This impression was deepened by the fact that, for good reasons of neutrality, the Government confined the work of its own schools and colleges to secular subjects. Another novelty, the examination-system, accentuated the more self-regarding side of education and, owing to the special difficulties imposed upon Indian students by the inevitable use of English as the medium, focussed an undue amount of their attention upon a side of school and college work which in England usually held a more subordinate place. For these reasons there has been a good deal of misunderstanding in India about the true significance of Western ideals of education.

41. But the misunderstandings, though important, were superficial. The more penetrating influences of the new movement of ideas lay deep below the surface. They were communicated through the personality of individuals rather than by books alone. They were expressed in tones of mind and of judgment, not in clear-cut

neralisations. In their variety, in their dissimilarity of view, and even in their hesitations, they were the true representatives of the real forces which were at work in the education of the West. They showed that the affinities between it and some of the chief characteristics of the ancient Indian tradition were closer than appears at first sight. They, like that tradition, laid stress upon the value of the personality of the teacher; upon religious influences in education; upon the disinterested love of learning; upon the need for freedom in the teacher's work.

42. The last seventy years in Western Europe, and not least in England, have been a period of confused struggle between different educational ideals. There has been a long endeavour to adjust each branch of education to the authority of the State without doing violence to the many living traditions which are found in each grade of national education. But, for the time at any rate, the tone of educational thought which prevails in England is not, in the older sense of the word, individualistic. The reaction has come. And, though individuality is once again fighting for recognition as a necessary side of the truth, popular views of education are influenced by the writings of Ruskin rather than by the writings of Bain and Smiles.

43. Those who, like Mr. Trivedi, believe that the ancient educational tradition of India embodied many principles which should be followed to-day will find encouragement in the new tendencies of educational thought in England. The Workers' Educational Association insists upon the importance of the purely disinterested and non-utilitarian side of education, not least to those who have to earn their living by the labour of their hands. There is an even more widely diffused conviction that those who are competent to follow higher studies should not be excluded from them by poverty. It is the general desire to preserve varied initiative in education, while at the same time eliminating personal considerations of pecuniary profit from its supply. And perhaps the crucial problem in English, as in Indian, education is to discover a way of giving public subsidy to education without hampering the freedom of those teachers who are qualified for their work. We are encouraged to hope that the Universities of Calcutta and Dacca will stand for an ideal in education which is not less faithful to the best Indian traditions because it is in harmony with the new educational aspirations of the West.

44. Convinced that nothing short of a comprehensive reconstruction of the university system will meet the needs of the time, we shall propose in the following chapters what can only be called a new departure in secondary and higher education in Bengal. Educational reform on a bold and generous plan may save Bengal from the loss and danger which threaten a country when the training of its educated classes has got out of gear with the economic needs of the nation. Those economic needs call for a spirit of industrial enterprise, awake to the claims of the community and of its work-people as well as to opportunities of private gain. The industrial and commercial interests of Bengal will be best served by a generation of young men trained to vigorous initiative, equipped with liberal culture, scientific in temper of mind, generous in social purpose, and freed from shamefacedness about working with their hands. A new kind of education is needed to fit young Bengal for the new kinds of work which it is in the interest of themselves and of their country that they should be better prepared to undertake. And the way to what is wise and farseeing in the planning of primary education for India (the most inspiring and most perilous of tasks) lies through such changes in the life of the University and of the high schools as will deepen the sense of fellow-service and will train judgment to social ends.

## CHAPTER XXXI.

### REFORM OF SECONDARY EDUCATION. PROPOSED NEW AUTHORITY.<sup>1</sup>

#### *I.—The need for a new authority for secondary and intermediate education.*

1. Those who have at heart the welfare of Bengal, and wish the whole community to advance in unity of purpose and in economic power feel strongly that the country needs more and better education; and that no boys and girls should be shut out, *either by the straitened means of their parents or by the remoteness of their home*, from access to the training which is best adapted to their capacity and designed to prepare them most effectively for citizenship and livelihood. It would be fair to express their view in the following words:—

The country is in urgent need of more schools and more colleges, but the schools should teach better and the colleges should give a more thorough preparation for life. To restrict education would be unjust and short-sighted. To reduplicate the existing kind of education would produce an academic proletariat, hungry, discontented and inept. But to improve education, while at the same time making it more accessible; to adapt it to the needs of modern industry, while at the same time guarding the interests of liberal culture; to raise the standards of university training, while at the same time excluding none who should prove their competence to profit by it—such a policy would be both wise and lucrative, a good investment and the fulfilment of a public trust.

2. It will be remembered with what cogency and weight of experience a large number of our correspondents urge that a test corresponding to the intermediate examination should be the standard of admission to the courses of the University.<sup>2</sup> They believe

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<sup>1</sup> For a description of the present state of the high schools in Bengal see Chapter VIII; of education in the European and Anglo-Indian secondary schools, Chapter XI; of the matriculation examination, Chapter IX; of the present arrangements for the recognition of schools, Chapter X; of the secondary education of girls, Chapter XIV; of the examination system, Chapter XVII; of the trend of opinion as to the medium of instruction in secondary schools, Chapter XVIII; and of the relations between Government and private enterprise in secondary education, Chapter IV.

<sup>2</sup> See Chapters IX and XII.

that many of the new educational facilities needed in Bengal should be provided at the stage which lies between the present matriculation and the intermediate; that this period in a boy's education might be put to better use; that within this space of two years it would be possible to give courses of training more adapted to the age of the pupils and diversified according to their intentions in life; and that a re-ordering and enlargement of the educational opportunities offered at this stage would utilise much mental power which is now running to waste; would invigorate the schools; would relieve the University from the encumbrance of immature students; would allow a more effective and timely preparation for practical careers; would improve the equipment of recruits for the subordinate grades of Government service, and would be beneficial to all public or private interests concerned.

3. In this view we concur, having been convinced by what we have seen in the course of our inquiry and by the evidence submitted to us that some of the work now attempted by the colleges would be better done elsewhere. An improvement in higher secondary education seems to us to be needed and to provide the key to the solution of this part of the problem of educational reform. We recommend, because it is one of the necessary conditions of the right delimitation between school and university work, that admission to the courses provided by the University in preparation for a degree should in future take place at the level of what is now called the intermediate examination. The present matriculation should cease to entitle a student to enter upon a university course. It comes at a stage in his education when it is premature to guarantee his fitness for that grade of work which alone it is appropriate for the University to require. But we should not approve such a raising of the standard of admission to the university if it were proposed as an isolated reform, still less if it were suggested as the sole remedy for present defects. We recommend it in context with a number of much needed additions to the educational resources of the Presidency. It is not as a limiting or restrictive measure that it appeals to us, but as one which will liberate for other and more fruitful use two important, and often misdirected, years in a student's life.

4. To raise the standard of admission to the University to the level of the present intermediate examination would by itself be no remedy for what is amiss in the higher education of Bengal. Better provision than now exists must be made for the training of students during the two years which they now give to the intermediate course at the University. We have therefore had to consider in what forms that training should be offered ; in what institutions it should be given ; how those institutions, whether belonging to Government or under the management of other bodies, should be adequately staffed with teachers ; and what should be the relations of those institutions to the high schools whether public or private. Thus the implications of our reference have constrained us to review the connexion between the University and the high schools. We have come to the conclusion that the future welfare of the University depends upon improvements being made in secondary education. And we find that this reform, along with other changes inseparable from it, involves a re-casting of a considerable part of the educational system of Bengal.

5. Whatever authority may take in hand the reorganisation of secondary and intermediate education in Bengal will find itself engaged upon a many-sided and difficult task. It will first have to plan the courses of training for pupils during the two years corresponding to the present intermediate stage, and to provide these courses at a number of convenient centres throughout Bengal. This part of the controlling authority's work will call for a study of the needs of the various callings in life for which pupils prepare themselves, both the callings like business, agriculture and the lower grades of Government service which in most cases are best entered at about 18 years of age, and also the callings for which a further course at the University or at a professional school is indispensable or expedient. The authority would then be in a position to decide what kind of examination it would be appropriate to hold at the end of each of these alternative courses of higher secondary education, and how these examinations should be conducted.

6. The authority would next find it necessary to determine what examination should admit to this two years' course and what subjects should be compulsory in it. Such an examination would be held at the end of the high school course

We suggest that it should be called the high school examination. Its aim should be to test the individual capacities and attainments of the pupils who have been trained in a high English school up to about sixteen years of age. It would mark the transition from the lower to the higher stage of a complete secondary education. We feel that for this test the title of school final examination would be a misnomer. To apply to it a name signifying the terminus of school studies would be misleading to the public and to parents. Such a usage would give too limited an idea of secondary education. It would suggest, and be wrong in suggesting, to employers and the public that the training which should be given in a good secondary school may be completed by a pupil at about sixteen years of age. This is far from being true, the next two years being of vital importance in the intellectual development of all promising boys or girls. At the same time, there are many pupils (at present about a quarter of the whole number who pass) who do not carry their formal education beyond this point. In their case a certificate of having passed the high school examination would be a useful credential. For the majority of the successful candidates it would be the passport admitting them to the next stage in their studies.

7. In order to decide what requirements it would be practicable to exact from the high schools in regard to this examination, the authority would be obliged to review the equipment of the high schools (the best teaching of science, for example, not being possible without some apparatus and facilities for practical work), the qualifications and skill of their teachers, the healthiness of the school premises, the means afforded for physical development and training, the school libraries, the aims and methods of inspection, and the conditions upon which schools should receive subsidies from public funds.

8. But the duties of such an authority would necessarily embrace even a wider field. Some of the courses provided in the stage of higher secondary education (now called the intermediate) would, for the reasons given in the next chapter, include a considerable measure of technical training. A wise adjustment of the technical part of these courses to liberal education on the one hand and to the special needs of industry and agriculture on the other would be possible only to an authority which acted in close co-operation

with the department responsible for technical education or was itself responsible for at least a considerable part of it. In Bengal as in England, it would be found that secondary and technical education are at certain points necessarily intermixed and, where combined in one course of training, should be under the supervision of the same authority. Still more clearly would this be seen when in future the work of continuation classes came to be considered.<sup>1</sup> In a well-organised system of education, continuation classes are in part technical, in part general, in scope. And a large proportion of their pupils are of secondary school age. The same authority which superintends secondary education should have direction of most continuation classes also and be responsible for their effective development. Again, a training in the scientific subjects which are required in preparation for the medical profession should be brought within the reach of pupils in some at least of the institutions giving higher secondary education. Lastly, the authority would touch the problem of primary education at one vital point—in the training of teachers of elementary schools. The years during which some of these teachers should receive their general and professional preparation fall within the stage of secondary education with which the authority would have immediate concern.

9. Thus the systematic reorganisation and improvement of higher secondary education in Bengal entails a central authority which would need to have under its superintendence (1) secondary and higher secondary education, (2) a part of technical education, (3) all the middle and upper grades of continuation classes (as soon as they are organised in Bengal), (4) some part of the preliminary training for certain professions, and (5) the work of many institutions giving professional preparation for teachers. Besides superintending all these grades of education, so closely related to one another that they cannot advantageously be placed under divided supervision, the authority might be of service in

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<sup>1</sup> Continuation classes are courses of instruction given in the day time or at night for students of from 14 years of age upwards who have already left the day school for employment or home duties but who wish to continue their education at times when their avocations allow them to attend. These classes are of three grades, the most elementary of the three being articulated with the work done in the primary schools, the middle and highest grades being of a standard comparable, subject by subject, with that reached in secondary day schools or even in more advanced institutions.

helping that part of the work of madrasahs which aims at giving a high school training, and would also need to give special attention to the courses of education for girls.

10. In order to discharge these duties, the authority would require to have large funds at its disposal. The improvement of the salaries and prospects of teachers in secondary schools is an indispensable condition of reform. The power of allocating substantial grants to inspected schools under the management of private bodies is not less necessary to success. And, in order that teachers in all recognised secondary schools may enjoy rights to superannuation allowances on the completion of their term of service, the authority should have power to organise a superannuation system and to contribute to its cost.

## *II.—Proposed composition of the new authority.*

11. It will be apparent from what has been said in the preceding paragraphs that the great advantages which would accrue from raising the standard of admission to the University from the level of the present matriculation to that of a new and improved intermediate examination cannot be secured without an extensive reorganisation of higher secondary education in the Presidency. But such a reorganisation will be successful in proportion to the good will with which it is viewed by the public at large. The public must feel assured that the proposed changes will give larger and more varied educational opportunities to the younger generation and that the financial sacrifices which they entail may confidently be expected to yield a remunerative return. Above all, the central educational authority must be so constituted as to command the confidence of the different sections of the community whose co-operation is indispensable to the success of any adequate plan of educational reform.

12. For the last-named reason, a plan which might appear at first sight to offer a simple solution of the difficulty must be dismissed as impracticable in Bengal. A proposal to transfer to the Department of Public Instruction in its present form the powers now exercised by the University in regard to the recognition of schools would arouse deep resentment in the Presidency and would excite widespread opposition. The evidence which we

have quoted earlier in this report<sup>1</sup> shows how ready public opinion would be to take alarm at any such curtailment of the influence of the University. A plan of educational reform based upon a transference to the Department of Public Instruction, as the latter is now constituted in its relation to Government, of the responsibility for the recognition of schools now exercised by the University would be regarded as a reactionary measure and as a menace to educational freedom. The intensity of the feeling must be borne in mind by all who may be responsible for proposing changes in the educational system of Bengal. The feeling springs from a conviction, or it might be truer to say from an instinct, that education should not be controlled in all its vital issues by a bureaucracy, however competent and disinterested, acting in the name of the Government. State action and State supervision are necessary as factors in educational policy, but they should leave a wide margin for the exercise of free initiative, even at the cost of what may seem to be waste of energy and some disregard of the intellectual standards accepted as authoritative by the expert opinion of the time. In Bengal the University, though closely connected with Government, has wisely been allowed to serve as one of the safety-valves of non-official opinion in educational affairs, and to exert its influence in a wider sphere than the purely academic. It has been given a large measure of responsibility for the secondary education imparted in high English schools—a responsibility which, however imperfectly it may have been discharged and in spite of its having failed in practice to secure variety of educational development, is jealously guarded as a guarantee against monopoly of Governmental control. This responsibility would not willingly be surrendered except to a new authority more representative of public opinion than the present Department of Public Instruction or even than the University itself. Rightly or wrongly, the proposal to transfer the responsibility from the University to the Department of Public Instruction has become associated in the public mind with designs unfavourable to the wider diffusion of educational opportunity. Our evidence shows that this suspicion is strong in some other parts of India. But it is nowhere more deep-seated than in Bengal.

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<sup>1</sup> Chapter X, paras. 32-38.

It would therefore be unwise to infer from the experience of the working of the school final system in other provinces that public opinion in this Presidency would be indifferent to any substantial transference of powers from the University to the Department of Public Instruction. In Bengal such a transference would jeopardise the good understanding between the Government and the educated classes upon which the prospects of effective reform in the existing system of education mainly depend.

13. These considerations would in themselves have sufficed to deter us from proposing that the duty of recognising schools should be transferred from the University to the Department of Public Instruction in its present form. But another reason makes such a plan impracticable. The Department, as it is now constituted, has neither the staff nor the organisation which would enable it to discharge with efficiency the responsible duties of a central authority for secondary education. It is undermanned. It is a subordinate department of the Secretariat. The funds at its command are inadequate to enable it to keep even the Government high schools up to a proper standard of staff and equipment, and fall far short of what is needed for the effective assistance of the aided schools. Its resources are so limited that it cannot offer inducements to all privately managed high schools to come under its guidance and inspection. More than half of the high schools in the Presidency lie altogether outside the range of its direct influence. The Department is powerless to offer the terms which would make it worth their while to associate themselves with an organised system of secondary education. If therefore by a stroke of the pen the recognition of schools were transferred from the University to the Department of Public Instruction in its present form, the latter would find itself in a position hardly less embarrassing than that now occupied by the University Syndicate. It would have responsibility without the means of discharging that responsibility in a way which would secure the welfare of secondary education. It would be unable to cope with the huge addition made to its work of inspection. For this reason, its inspections would in most cases be hurried and lacking in the friendly suggestions as to methods of teaching and organisation which are the most valuable part of school inspection but necessitate frequent visits to many schools and an knowledge of their circumstances and difficulties. The Depa. could be unable to provide the grants-in-aid

which are needed if the weaker schools are to be raised to a proper level of efficiency. It would therefore be faced with an intolerable situation. Its choice would often lie between depriving a locality of its sole and slender opportunities of secondary education and granting recognition to a school which had little claim to be recognised.

Knowing the keen interest which the officers of the Department of Public Instruction take in the education of Bengal, and having had many opportunities of realising the value of the service which they render, we feel that it would be unfair to them to recommend a plan which would inevitably put them in a false position and would throw upon them duties which under existing conditions they could not possibly discharge.

14. The fact is that secondary, like university, education in Bengal has reached a stage at which further satisfactory progress is impossible without a complete reorganisation of the existing administrative conditions. The whole system is suffering from anaemia, which is due partly to lack of funds, partly to the lack of an energetic purpose aiming at improved standards of teaching and of educational opportunity. There can be no substantial improvement without reconstruction. The existing system cannot be patched up. What is needed is far-reaching reorganisation. And such a reorganisation is impossible except on two conditions. It must have behind it a strong movement of public opinion; and it must be accompanied by greatly increased expenditure from public funds. There are many signs that public opinion in Bengal realises the value of education. It will be for the Government and the tax-payers to decide whether they are prepared to furnish the funds which any serious improvement of education in the Presidency will require. We ourselves entertain no doubt that a greatly increased expenditure upon education, an expenditure to which public funds and private liberality should contribute, is necessary in the interests of Bengal and that, if wisely directed, it will be remunerative. But, as a first condition to the effectiveness of such expenditure, we would emphasise the need for a reconstruction of the existing system of educational administration upon lines which will encourage public opinion to co-operate more closely with the Government and will enable consideration to be given to the needs of national education as a whole.

15. There is a fundamental unity in national education which should be recognised and strengthened by the system adopted for its administration. The secondary schools should rest upon a sound foundation of elementary teaching; the universities depend upon the work done by the secondary schools in preparing students for their degree courses; technical education in its different grades presupposes a good preparation in the elementary and secondary schools. This is not to say that in any grade all the schools should work on one pattern. Still less does it indicate that the Government should have a monopoly of educational control or discourage independent initiative alongside of its own efforts. But it means that, with many diversities of method and with stress laid upon different sides of school work in a variety of schools according with the aims and convictions of different sections of the community, there should be a broad purpose common to the whole of the educational system of the country. And the central authority of the State, representing the diverse elements of the people, should have cognisance of the whole of education and should give the aid necessary to the healthy development of all its parts. Nor is this the only point of view from which the problems of public education in its several grades are seen to be closely inter-related. Directly or indirectly the whole community is concerned in the welfare and progress of the universities, of the technical institutions and of the secondary and primary schools. All of these are designed to further the collective interest of the people. The State is therefore called upon to take a large view of education in all its branches, to encourage their coordination, to direct public attention to the services which they severally render and to require the tax-payer to provide the funds which may be necessary to their maintenance in an efficient condition. To whatever special bodies it may entrust the administration of the different grades of education, the State cannot abrogate the duty of exercising a general superintendence over education as a whole and of securing a balance and a well-proportioned development of all its sides. It is outside our province to discuss the question of the administrative machinery by means of which such general superintendence may be exercised in the manner which will secure the maximum of civic co-operation and of administrative economy and precision. It will be sufficient to say that, in the recommendations which we are about to make, we presuppose the unifying influence of the State; and we regard that influence, if so applied

as to encourage liberty of thought and diversity of enterprise as fundamentally necessary, through whatever organ it may be exercised, to the welfare and progress of public education.

16. As part of the reorganisation of the educational administration of Bengal, we think it desirable that there should be a change in the position and powers of the Director of Public Instruction. He should be the principal adviser to the Member or Minister responsible for education. As the work of Government expands in this sphere and grows more onerous and complicated, it will become the more necessary that the Member or Minister in charge of the subject should have the assistance of a high official intimately acquainted with the conditions and needs of every grade and type of education. The duties of the Director of Public Instruction will thus become even more responsible than they have been in the past, and we attach great importance to the influence which he will be in a position to exercise through his knowledge both of the business of the various authorities with which the Government will be associated in the various grades of education—university, technical, secondary and elementary—and also of educational developments in other parts of India and abroad. In view of the increased responsibilities which will thus devolve in future upon the Director of Public Instruction, we think that he should be a secretary to Government. This higher status would correspond to the enhanced importance of public education in the business of the State.

17. We have seen that public education in all its many ramifications and under its various forms of management is rightly regarded as one aspect of national life which calls for recognition as an undivided whole by the State. But there are parts of it which present problems so unlike those requiring solution in other grades as to lend themselves advantageously to separate administration. Among the parts of education to which such distinct administration is appropriate is that comprising the schools and colleges which prepare pupils for the universities. It is with this part of education that we are specially concerned in this chapter of our report and, on general grounds alone, we should have been prepared to recommend that the high English schools, from which the universities draw the successive generations of their students, should receive special administrative treatment in any reorganisation of the edu-

ational resources of the Presidency. But the existing circumstances in Bengal make such a recommendation not only appropriate but inevitable. In Bengal we find that the high English schools suffer from the effects of a division of responsibility between the University and the Department of Public Instruction.<sup>1</sup> The University, which decides whether a school shall have the right to present candidates for matriculation, does not command the funds wherewith it might enable the weaker schools, where these are necessary to meet the needs of their district, to attain to a proper level of efficiency in their staff and equipment. The Department of Public Instruction which has, or should have, the funds for subsidising the schools, has no responsibility for deciding whether a school deserves to enjoy the matriculation privilege upon which its prosperity and even its existence depend. Moreover, in Bengal as elsewhere in India, what should be the province of higher secondary education is divided in such a way as to fall at present under two independent jurisdictions. The high English schools, in so far as they depend wholly or partly upon public funds, come under the supervision of the Department of Public Instruction. The intermediate courses, which should be so recast as to afford more varied educational opportunities to students who have completed their course at the high school, are at present under the care of the University which, naturally enough, regards them simply as part of the academic curriculum.

18. Thus, as a preliminary to the satisfactory organisation of public education in Bengal, there is need for a fresh delimitation of the frontier which divides the province of university from that of higher secondary education. The present division of responsibility between the University and the Department of Public Instruction should be replaced by a form of superintendence which would combine the experience of these two authorities in effective union and would associate with them representatives of the great callings for which the schools and intermediate colleges would prepare many of their students. And, as a basis for more generous aid to the educational institutions concerned, both as regards the payment of their teachers and the improvement of their equipment, all the high English schools should be encouraged to come within the purview of the central authority. If, as we hope,

<sup>1</sup> Chapters X, paras. 1-28 and XXVIII, paras. 50-53

great period of educational advance is about to open in Bengal, the new conditions will call for close co-operation between the University, the public and the Government. That co-operation should be embodied in a new system of administration, the main features of which we proceed to define.

19. We do not speak here of the system of administration which the Government of Bengal may find it desirable to adopt as a means of discharging its general and fundamental responsibilities towards all grades of education in the State. We confine ourselves to a narrower but hardly less important issue, namely, the method of organisation by which it will be able to secure in the special circumstances of the Presidency the form of superintendence likely to prove most effective in practice and most acceptable to public opinion in the sphere of secondary and intermediate education. The distinct nature of the issues which arise in this part of public education, the uncorrelated statutory powers of the University and of the Department of Public Instruction which have to be harmonised before co-ordinated control can be secured, and the complex technical problems which must be solved in seeking to establish a smoothly working system of administration, differentiate this from other parts of the task which Government must essay in the arrangement and rectification of educational opportunities in Bengal.

20. We propose therefore that the duty of remodelling this grade of education and of raising it to a state of efficiency should be entrusted to a new Board of Secondary and Intermediate Education so constituted as to be representative of the various forms of experience which have a valid claim to be consulted in this matter. This authority should not be merely advisory or consultative but should exercise executive powers in the sphere of secondary and intermediate education. We recommend therefore that it should be in such relation to Government and the Legislative Council as will secure to it the necessary grants from public funds and will lay open its work to general review along with that of other parts of the educational administration of the State.

21. It will be borne in mind that no satisfactory reorganisation of secondary and intermediate education is possible in Bengal unless three duties which now devolve upon the University are transferred to the Board. The first of these is the determination

of the courses of study which should be followed in the institutions providing intermediate training and in the high English schools in preparation for that training. The second duty is the conduct of two very important public examinations. The third duty is that of deciding which of the high English schools should be recognised as entitled to present candidates for the earlier of these examinations and which of the institutions giving intermediate training should enjoy the corresponding privilege of presenting candidates for the later one. These duties, however, could not be effectively discharged by a Board whose powers were limited to those functions only; and such a limitation would be unwise because certain to reproduce the administrative *impasse* which has arisen from the present division of responsibility between the University and the Department of Public Instruction.

22. We are now in a position to discuss the composition of the Board to which we recommend that the duty of organising and developing secondary and intermediate education should be assigned. In the first place, the University of Calcutta and the University of Dacca should each send representatives to the Board in numbers sufficient to secure an adequate expression of university experience and requirements. The universities have a valid claim to a share in the responsibility of influencing and guiding the institutions which impart the education preparatory or ancillary to degree courses. We think that the universities should severally select their own representatives to serve on the Board and that their nominations should be accepted by Government. Secondly, in order that its policy may be kept in harmony with the requirements of practical careers, the Board should include representatives of agriculture, industry and commerce. The special experience of these members, besides giving weight to the Board's authority, would be available in the arrangement and supervision of the courses which will prepare students during their intermediate training for the practical and scientific needs of the farm, the workshop and the office. Thirdly, seeing that one of the most important duties of the Board will be to provide courses of training favourable to the physical development of the students and to secure a high standard of hygiene in the premises of the institutions under its care, its members should include a medical man with experience in the problems of public health. - Fourthly, one or more persons experi-



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enced in teaching and well acquainted with the present conditions of work in secondary schools and intermediate classes in Bengal should have a place on the Board, in order that the plans for new courses of study and for modifications in the examination-requirements may be framed with due regard to what is wise and practicable for boys and girls alike. This provision seems to us desirable on account of the influence which regulations for examination exert upon methods of instruction. But, in addition to those elements which we have enumerated, there are three others which appear to us to be indispensable constituents of the Board. First, there should be a personal link between the Board and the non-official members of the Bengal Legislative Council. Secondly, the Director of Public Instruction should be *ex-officio* a member of the Board, because his experience will be of the highest value in its deliberations and because a close connexion will be maintained in this way between the Board and the Department of Public Instruction. Thirdly, there should be an adequate representation of Hindu and Muslim opinion and interests. It is clear that the success of the Board's work will depend upon its combining expert judgment with an intimate knowledge of the needs and sentiments of the community which it serves.

23. It will doubtless be found possible to secure, at any rate in part, an effective representation of Hindu and Muslim opinion by means of the selection of some of the members who will be primarily chosen for their special experience in the callings mentioned in the last paragraph. But if this should fail to furnish the Board with a sufficient number of members able to speak with weight on behalf of the Hindu and Muslim communities, we regard it as of great importance that the deficiency should be supplied by special nominations. And in present circumstances this need is more likely to arise in the case of the Musalmans than of the Hindus. We are aware with what anxiety the leaders of the Muslim community have regarded, and still regard, proposals for the establishment of a Board of Education.<sup>1</sup> Our own proposals differ widely from those to which the criticisms of the Muslim leaders were addressed. But in so far as the plan which we recommend would

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<sup>1</sup> See memorandum of Nawab Syed Nawabaly Chaudhury (Question 4) and speeches of Mr. Aminur Rahman, Maulvi A. K. Fazlul Huq and others in the Bengal Legislative Council, September 4th, 1917.

entrust to a composite body some powers and duties which are now exercised directly by the Government, we realise that it may be regarded with some of the misgivings which were entertained by the representatives of Muslim opinion with respect to other proposals. We would emphasise therefore the importance of securing for the Musalmans, who form so important a part of the population of Bengal, effective representation upon the Board of Secondary and Intermediate Education. Their educational traditions require special attention. Their difficulties (arising mainly from an educational backwardness from which they are making great efforts to emerge) give them at this time a claim to exceptional encouragement.<sup>1</sup> And, if the membership of competent Musalmans is secured upon the Board and if in the allocation of funds and in the definition of the duties and powers of the Board the Government assure due regard being given to Muslim requirements, we entertain the hope that the anxiety felt by the Muslim leaders as to the possible effects of the action of such a composite authority upon the educational interests of the Musalmans may abate and give place to a feeling favourable to a plan which in our judgment will promote Muslim culture and conduce to increased vigour and unity in the education of Bengal. We share their wish to encourage the new educational hopes and ambitions of Muslim students in Eastern Bengal and elsewhere, but are convinced that the realisation of those hopes can be compassed only by improvements in schools and colleges which a well-organised central authority, so constituted as to pay regard to communal needs, will alone have the power and funds to secure.

24. It is not easy to combine the variety of elements which, for the reasons stated in the preceding paragraphs, must find a place in a Board of Secondary and Intermediate Education for Bengal with the strict limitation of numbers which is desirable on grounds of economy and of administrative convenience. Were the latter the conditions with which alone it was necessary to comply, we should have proposed a Board of from five to seven members. But the special circumstances of the problem which presents itself for solution in Bengal make the representation of many interests and kinds of experience indispensable. And in the first years of the Board's work this combination of varied elements will have the

positive advantage of securing due regard to diverse interests and educational needs, and of thus establishing from the beginning of the new system a broad tradition in the administration of secondary and intermediate education.

25. In a Board of from fifteen to eighteen members it will be possible to provide for the representation of the necessary kinds of experience and of the interests involved. We do not regard this number, which in the special circumstances of the case cannot be reduced, as being unduly large or as incompatible, under the conditions which we shall propose, with the effective discharge of the duties for which the members will be responsible. Two conditions should be complied with in the constitution of the Board. Its members should be so chosen as to secure the presence of not less than three members both of the Hindu and of the Muslim communities, in order that Hindu and Muslim opinions and interests may be represented in its deliberations. And a majority of the Board should be non-officials, *i.e.*, not in receipt of a salary directly paid by Government.

Subject to these conditions the Board should consist of the following members :—

A President, who should be a salaried and whole-time officer appointed by Government for a period of years to be defined.

The Director of Public Instruction, *ex-officio*.

One member elected by the non-official members of the Legislative Council of Bengal.

Seven University representatives, five being appointed by the University of Calcutta (one of these having special knowledge of mufassal conditions) and two by the University of Dacca. The appointments should be made in each case by the University-Court, but it should be the duty of the Executive Council of the University to suggest names for the consideration of the Court. Some of these appointments might be so made as to include representatives of the kinds of experience mentioned below. Casual vacancies should be filled by the Executive Council.

Five to eight members (as might be found desirable or necessary) appointed by the Government of Bengal and chosen on the ground of their special knowledge of education and with a view to the representation of the following categories of experience, if not otherwise provided for :—

Agriculture :

Industry and Commerce :

Medicine and Public Health :

Teaching in intermediate colleges and in secondary schools :

The education of girls :

The educational interests of the domiciled community.

Ordinary members should hold office for a term of three years and be re-eligible.

26. A Board thus constituted would be able to meet at sufficiently frequent intervals and to pursue a continuous and consistent policy. Important executive responsibilities would necessarily devolve upon the President to whom, with the help of the Secretary and his staff, would fall the duty of arranging the business in a form which would enable the Board to make a rapid decision upon administrative questions submitted to it. The office of the Board should, if possible, be in the same building as that of the Department of Public Instruction. This arrangement would be administratively convenient and would allow the most economical use to be made of the clerical staff.

27. The Board would find it necessary to appoint expert standing committees to deal with special branches of its work in connexion with the various examinations and courses of study. It should appoint a special Advisory Committee, including representatives of the University Board of Women's Education,<sup>1</sup> to consider and report to it on the needs and curricula of schools and intermediate colleges for girls. The Board should also form a special committee, upon which the Islamic Department of Dacca University should be strongly represented, to conduct the examination held at the end of the reformed madrassah course and corresponding to the present matriculation, and also the examination held two years later and corresponding to the intermediate examination in Islamic studies.<sup>2</sup> The work of this special committee should, as far as possible, be done at Dacca. The Board would also find it convenient to appoint an advisory committee which it could consult on questions affecting the educational welfare of the now backward classes.<sup>3</sup> Furthermore, if the members of the Board should think it desirable to have regular opportunities of discussing questions of importance with those engaged in educational work in the various districts of Bengal, it should be within their power to constitute, in consultation with the Government, other Divisional Advisory Committees or a general Advisory Council widely representative of experience in secondary and intermediate

<sup>1</sup> Chapter XXXVII, paras. 83-85.

<sup>2</sup> Chapter XVI and Chapter XIII, para. 108.

<sup>3</sup> Chapter VII.

education in the Presidency. If such an Advisory Council were formed, occasional meetings would suffice for its deliberations.

28. A necessary part of the new arrangements which we propose is that the University of Calcutta should receive from the Government an annual grant to compensate it in full for the loss of the income which it now derives from fees paid to it by candidates for the matriculation and intermediate examinations. This grant should be permanent and be additional to the present and any future subsidy required for the new developments of the Teaching University in Calcutta and for the improvement of the colleges in the mufassal. It should be based upon a careful estimate of the net income which the University of Calcutta enjoyed for general university purposes from the conduct of the above-mentioned examinations in the academic year or years immediately preceding the establishment of the Board.

29. Before proceeding to discuss the duties and powers of the Board of Secondary and Intermediate Education, we must consider the situation which may arise in the first stage of the transition from the present arrangements. Any one of three contingencies may arise. First, the establishment of the Board may be undertaken concurrently with the reconstruction of the University of Calcutta and with the establishment of the University of Dacca. Secondly, the Board may be established before steps are taken to reconstruct the University of Calcutta. Thirdly, the reconstitution of the University of Calcutta and the foundation of the University of Dacca may precede the establishment of the Board. The first of these three cases calls for no further consideration at this point in our report.<sup>1</sup> With respect to the second case, it will be borne in mind that the remodelling of the intermediate courses, the provision of new intermediate colleges throughout Bengal and the relief of the University and its affiliated colleges from the duty of giving instruction to students in the intermediate grade are fundamental conditions of university reorganisation and reform. We regard it as essential that in Bengal the duties of conducting the high school and intermediate examinations and of recognising high English schools should be entrusted to a representative Board, and we are not prepared to recommend that, pending the establishment of such a Board, they should be assigned to the Department

<sup>1</sup> Chapters LI and LII.

of Public Instruction. But there would be no objection to the establishment of the Board of Secondary and Intermediate Education as soon as the University of Dacca is founded but before the reconstruction of the University of Calcutta is taken in hand. Indeed, so far as Calcutta is concerned, there would be many advantages in thus approaching the problem.

30. If however, as in the third case contemplated above, it were decided that the reconstruction of the University of Calcutta should be undertaken before the establishment of the Board of Secondary and Intermediate Education, the Act reconstituting the University of Calcutta should retain in the hands of the University, as regards the whole area within its jurisdiction, the responsibility of conducting the above-mentioned examinations and of granting recognition to high English schools until such time as in Bengal a Board of Secondary and Intermediate Education shall have been established with a view to taking over these functions and until in Assam and Burma such arrangements have been made for this purpose as may seem expedient to the Governments of those provinces. The Executive Commission of the University<sup>1</sup> should be directed by the Act to entrust these duties to a special committee, upon which the University of Dacca should have two representatives, and to delegate to this committee full powers in regard to the two examinations and to the recognition of schools. So far as Bengal is concerned, we suggest that, pending the establishment of the Board of Secondary and Intermediate Education, the Government should appoint an advisory committee on this branch of education and should include in its membership representatives of non-academic experience. This advisory committee and the committee appointed by the University should be instructed by the authorities respectively appointing them to work in close association; and with this end in view it is desirable that the committees should have some members in common. The case of Assam presents its own difficulties for which we think that the local administration would readily find a solution, but the change in the administration of the matriculation and intermediate examinations should take place in that province simultaneously with the change in Bengal. In Burma the whole position will be transformed by the establishment of the new

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<sup>1</sup> Chapter XXXIV.

University in that province, and we hope that this may be found possible at an early date.

### *III.—Proposed duties and powers of the new authority.*

31. We shall now consider the duties which will devolve upon the Board of Secondary and Intermediate Education for Bengal and the range of executive responsibility which it would be necessary to assign to it. It has been shown above that the Board must determine the courses of study in the institutions which will give intermediate training and must conduct the examination which will come at the end of the intermediate course. It must also conduct the examination which will be taken by candidates in the highest class of the high English schools and will admit those who are successful in passing it to the courses of intermediate training. Furthermore it is necessary that the Board should exercise another function, namely, that of determining which of the high English schools should have the privilege of presenting candidates for the examination corresponding to what is now called the matriculation. But these duties cannot be divorced from other and wider responsibilities without setting up a complicated system of divided control which, besides being unnecessarily expensive, would be harassing to the schools and colleges and certain to lead to delays and friction in administration. This is clearly shown by a closer consideration of the nature of the work which the Board would have to undertake.

32. Its work will fall into two main divisions, inseparable from one another but nevertheless so distinct as to admit of separate description, *viz.*, that concerned with the intermediate courses and examinations and that concerned with the high English schools. As regards the first, the conduct of the new intermediate examination will present considerable difficulties. In point of the number of candidates it will be upon a smaller scale than the matriculation, but it should be brought into a much closer relation to the teaching than is the case with the intermediate examination which it will replace. This improved method of examination, which we shall describe in later paragraphs of this chapter, will entail the employment of a large staff of visiting examiners who should be in the service of the Board and be wholly at its disposal, at any rate during

the part of the year in which the examination will be in progress. These visiting examiners would among them go for two or three days in every year to each of the institutions giving intermediate training. They would inspect the teaching in the different branches of instruction, each visiting examiner taking the subject or subjects of which he has made a special study. They would report to the Board upon the efficiency of the instruction as well as upon the attainments of individual candidates. The Board would thus be informed of the qualifications and competence of the teachers and of the influence of its regulations upon the standard of the work done in the institutions concerned.

33. Now it is obvious that the authority which thus conducts the intermediate examination will be in the best possible position to decide which of the institutions giving intermediate training are doing their work efficiently and should continue to enjoy recognition. To hand over to a second authority the duty of reporting on the efficiency of the intermediate institutions would be wasteful and would lead to unnecessary duplication of inspection as, by care in the selection of the visiting examiners and in framing the instructions given to them, it would be possible to secure from them general reports bearing upon the administrative as well as the educational efficiency of the institutions concerned. Clearly the best arrangement would be to put into the hands of one and the same authority the duty of conducting the examinations, of reporting upon the general efficiency of the institutions, and of deciding whether recognition should be given to a proposed new institution for intermediate training. A division of these duties between two authorities would inevitably produce conflict of jurisdiction and waste of public money. The Board of Secondary and Intermediate Education, which must conduct the examinations *in situ*, should therefore be entrusted with the other duties also.

34. By reason of its intimate knowledge of the work of the intermediate institutions, the Board will be the authority best qualified to determine what grants should be given, out of public funds voted for the purpose, to recognised intermediate institutions under non-Governmental management. And, as the body most familiar with what is required in intermediate education in order to meet the needs of students in Bengal, the Board will also be better fitted than any other authority to undertake the responsibility for staffing

and maintaining those of the intermediate institutions which will be the property of Government. The duties of recognising intermediate institutions as efficient, of planning their courses of instruction, of conducting their examinations, of inspecting and guiding their work, and of assigning to them the grants from public funds which may be needed to secure their adequate staffing and equipment are so intermixed and dependent upon one another that it would be wise to entrust them all to one body. A partition of these duties between two co-ordinate authorities would be artificial and embarrassing. In practice, before deciding what courses of study it would be possible to prescribe with any assurance of educational success, the Board would need to know whether the institutions concerned would receive from public funds the assistance necessary to enable them to provide the proper staff and equipment. It would be well therefore that the same authority should have in its hands the duty of fixing the courses and of apportioning (within limits determined by Government) the grants upon which the effective organisation of those courses would depend. Again, it would be desirable that each intermediate institution should look for recognition and aid to the authority which framed its courses and conducted its examinations. Otherwise it would be harassed by communications and orders from two departments which might not be in full agreement upon educational aims. Even if the two authorities acted in unbroken harmony, there would be unnecessary trouble and expense. If, on the other hand, there were disagreement or friction between them, the welfare and progress of a vitally important part of public education would be retarded. We have considered the arguments which may be urged in favour of dividing the responsibility between two authorities and consider that they have little weight as compared with those in favour of unified administration. The Board will be as well fitted as any department to manage the Government institutions for intermediate training. The members of the Government educational services who serve on the staffs of those institutions would be lent to the Board and their position under it would be as secure as under the Department of Public Instruction. The arrangements which we shall propose in a later section of this chapter for the better staffing of the intermediate colleges would be as conveniently entrusted to the Board as to any other authority. And, so far from being relieved from difficulties by having to divide its

responsibilities for intermediate education with another authority, the Board would be embarrassed at every stage of its work by the resulting conflict of jurisdictions. We recommend therefore that in the sphere of intermediate education the Board should have full responsibility for superintending all the work of all the institutions of this grade.

35. But the administrative problem with which we are here concerned is not limited to the sphere of intermediate education. The duty of granting recognition to high English schools and of conducting the examination (corresponding to the present matriculation) which will come at the end of their course must appertain to the Board of Secondary and Intermediate Education because the Board will inherit those duties from the University. The question arises therefore whether the Board should also be charged with the duty of laying down regulations for the high English schools, of managing those which are the property of Government, of apportioning among the aided schools the public funds available for the assistance of their work, and of giving guidance to them by a system of inspection. The alternative would be to retain these duties in the hands of the Department of Public Instruction. Here again there are decisive reasons in favour of avoiding any division of responsibility between two central authorities, each exercising administrative functions in the same grade of public education. The Board which would have the duty of recognising new high English schools and of withdrawing recognition from those which show themselves unworthy of continuing to enjoy that privilege must, if its work is to be well done, keep itself intimately acquainted with the state of those schools in general and with the standard which it is practicable to enforce in regard to their teaching and equipment. Its responsibility would be unreal if, in order to arrive at a decision whether it should grant recognition or withhold it to a school, it had to rely wholly upon the reports made by another authority. Further, before deciding what changes it would be expedient to make in the examination corresponding to the present matriculation, the Board would require to have full knowledge of the teaching power of the staffs of the schools and of the equipment possessed by the latter, in order that it might judge what changes in the rules of the examination would be salutary and efficacious. Yet again, the Board would find that the advisability of insisting upon new requirements in the examination (as for example in science)

depended upon the capacity of the schools to improve their staffs of teachers and to provide laboratory accommodation for practical work. But, if all responsibility for the allocation of aid from public funds lay with another authority, the Board would not be in a position to guarantee to the schools the increased assistance which would be necessary to enable them to comply with new examination requirements. This would deprive it of a power necessary to full efficiency in its work and might lead either to the postponement of important reforms in the examination or to the imposition of new requirements upon schools financially unprepared to meet the expenditure entailed by them. We think therefore that the wiser course would be to entrust to the Board full responsibility for the administration of all Government high English schools and for determining the conditions upon which grants-in-aid should be given to high schools under non-Governmental management. Under any other arrangement there would be waste of public money through divided jurisdiction and duplicated inspection, as well as delay in administration through dual control.

36. We recommend therefore that it should be the duty of the Board to submit annually to the Government of Bengal a budget estimate of the sums required during the ensuing financial year for secondary and intermediate education in the Presidency, and in particular the heads of additional expenditure required. The Government would then decide how much could be afforded from public revenues for these purposes. The detailed expenditure of the various sums assigned each year by the Government for high English schools, for intermediate institutions and for other purposes should be left to the discretion of the Board, subject to such conditions as the Government might think well to attach to it, as for example a requirement that not less than a certain proportion of a specific assignment should be devoted to a specific purpose such as the improvement of educational facilities for Musalmans. The Board would be responsible for the upkeep and staffing of such intermediate institutions as were the property of Government and also of the Government high English schools. It would make grants-in-aid to those intermediate institutions and high English schools which were under non-Governmental management. The public would feel that secondary and intermediate education was in the care of an

authority intimately acquainted with the needs of Bengal and determined to improve and enlarge its educational opportunities. The Government would be able to rely upon the knowledge and experience of the Board. And the Member or Minister in charge of education would have its assistance in dealing with one of the most difficult and important parts of the problem of national education. The Board, as we propose it, would be one section of a reorganised education department—a department very unlike the present department in its constitution and powers but much better adapted to the work of enlisting public opinion in the cause of educational progress. The Director of Public Instruction would *ex officio* be a member of the Board; but we think that, if the proposals made in paragraph 16 above are accepted, he should not be its chairman. It is desirable that he should be relieved so far as possible from detailed administrative work in order that he may act as chief of the general staff to the Member or Minister in charge of education. So far from weakening the authority of the Director of Public Instruction, the plan which we propose would give him increased opportunities of influence and would go a long way towards identifying the educational reorganisation of the State with the best and most responsible elements in public opinion.

37. It is for these reasons that in view of the special needs of Bengal we do not hesitate to recommend the adoption of the plan of a Board in preference to that form of organisation which has been adopted in the English Board of Education. The latter is in practice a body of permanent officials graded in a hierarchy of ranks and acting under the orders of a minister who is a member of a Government which is responsible to Parliament. In England however the most influential of the secondary schools are wealthy foundations which, though they do not any longer stand outside the system of public education, are virtually independent and could resist successfully any action of the Board of Education which threatened their freedom of initiative. In Bengal there are no Indian educational institutions which correspond to those great endowed schools and could maintain their independence against mistaken interference on the part of a body of officials. The safeguard of public opinion therefore, which in English administration is in part secured by the virtual autonomy of the great secondary schools, must be provided for in some other way in the adminis-

tration of secondary education in Bengal. It will be secured by entrusting the supervision of secondary education to a representative Board which will have the advantage of being in close relation to the Government and of commanding the services of a body of trained permanent officials. Another circumstance makes the problem of educational administration in Bengal very unlike that which presents itself in England. In Bengal the local educational authorities are weak and have little influence in higher secondary education. In England they are very strong and neutralise any tendency towards excessive centralisation of educational control. There should therefore be in the educational administration of Bengal some influence which will serve as a makeweight against the otherwise preponderating influence of a central body of officials. We believe that such a makeweight will be found in the authority of the representative Board of Secondary and Intermediate Education set in the framework of the central administration:

38. We have accordingly now to consider the constitutional relation in which the Board of Secondary and Intermediate Education would stand to the Government of Bengal. The Board which we think it necessary to propose would be of a composite and representative character. It would be a powerful agency of public opinion. Some of its members would be appointed by the universities without interference from Government. A majority of the Board would be non-officials, and therefore in no way under direct Governmental control. A Board of this character seems to us indispensable in the conditions which prevail in Bengal, and to be the only kind of new central authority for intermediate and secondary education to which the important powers now exercised by the University in regard to intermediate training and the recognition of schools can be transferred without arousing serious controversy and opposition. But we are aware that we are proposing a form of central authority which has at present no exact counterpart either in India or in the West. We are bound therefore to explore its relations to Government in order that precautions may be taken against any risk of deadlock in the practical execution of our plan.

39. Though it is desirable that the Board should enjoy freedom to act upon its own responsibility in framing and enforcing the

regulations which it may find necessary for the welfare of secondary and intermediate education, it must be ultimately responsible to the Government of the country ; and, in the event of a final disagreement between it and the Government, the will of the latter must prevail. Our plan reduces to a minimum the likelihood of such disagreement. Each year the Board would submit its financial estimates to Government, and the latter would have the opportunity of withholding its assent from any proposals which did not meet with its approval. The regulations of the Board would be published and would therefore come within the cognisance of the Government and of the Legislative Council and be open to criticism from either body. Such criticism would naturally carry great weight with the Board. Therefore, though the latter would rightly exercise its own judgment in deciding the difficult educational problems which would fall within its scope, the likelihood of its coming into conflict with Government upon grave questions of public importance is remote. But if such a contingency should ever arise, the Government should have power of overruling the Board. Such action however should follow a procedure which would mark the gravity of the situation and bring the question at issue before the public and its representatives. We recommend therefore that the Government should have the power after due inquiry to require as an extreme measure the resignation of the Board ; but that, if this step is ever taken, it should be necessary for the Government immediately to lay before the Legislative Council for its consideration and discussion the papers showing fully the matters in which the Government and the Board were in disagreement and the reasons which had led the Government to require the Board's resignation.

#### *IV.—The conduct of the intermediate college examination.*

40. We shall now describe the method which we recommend for adoption by the Board of Secondary and Intermediate Education, in conducting the examination at the end of the intermediate course.<sup>1</sup> It is desirable that each candidate should have an opportunity of showing his knowledge and ability not only in a written test but also under oral examination. We suggest that visiting

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<sup>1</sup> The courses which would be given to the Intermediate Colleges are described in Chapter XXXII.

examiners, chosen in view of the different subjects of the curriculum taken in the institution concerned, should be sent annually to each intermediate college in one or more groups at convenient times during the closing months of the academic year. The examination of the candidates should consist of two parts, the one oral, the other written. To each part, in those subjects in which both oral and written examination are required, a due proportion of marks should be assigned. In order to pass the examination in any such subject a candidate should be required to reach a certain level of excellence in each part. The note-books of the students should be preserved for inspection and should be open to examination by the visiting examiners at the time of their visit. In English an oral as well as a written examination should be required in the case of every candidate. In each branch of physical science, there should be for every candidate not only a written examination but also a practical and oral examination in the laboratory. Similarly in subjects introductory to medicine, engineering and agriculture there should be a practical examination conducted *in situ* by a visiting examiner of the Board as well as a written examination. Each candidate taking teaching as one of his subjects should, besides submitting to written examination, take a class in the presence of the visiting examiner. The written part of the examination in all subjects should be conducted by means of papers, prepared by a Board of Examiners acting under the authority of the Board of Secondary and Intermediate Education, the papers in each subject being normally the same for all the intermediate colleges.<sup>1</sup>

41. Such a method of examination would encourage greater proficiency in the speaking of English; would attest the quality of the work done by students throughout their course; and, in some subjects at any rate, would tend to relieve the pressure of the written test.

42. The examination would be taken by each candidate in one of a number of groups, the latter being preparatory to a variety of callings. If passed upon conditions approved by the university, it would entitle the successful candidate to admission to a course of study for a degree. It would give admission to

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<sup>1</sup> The written examination should be held as nearly as possible at the end of the college year, the oral examination as a rule preceding the written.

professional schools in engineering and agriculture, and would qualify for entrance to competitive examination for certain grades of Government service. A public authority enjoying the highest prestige, aided by the best expert knowledge in the country, intimately associated with Government and able to speak with the support of the two universities of Calcutta and Dacca would alone be competent to conduct an examination of such crucial importance alike to the individual candidates and to the public interests of Bengal. Moreover the mode in which such an examination should be conducted would entail expense beyond the resources even of the two universities acting together and still more beyond those of any other institution in the country.

43. We estimate that, in order to meet the needs of the whole Presidency, courses of intermediate training would have to be provided in, say, from thirty to forty intermediate colleges conveniently distributed throughout Bengal, including Calcutta.<sup>1</sup> Some of these colleges would be self-contained; others, developments of existing high schools. There is good precedent for giving the title of college to institutions engaged in the work of higher secondary education. In the West some of the most famous schools which train boys up to this stage are called colleges; for example, Winchester and Eton among the ancient foundations; Marlborough, Haileybury and Clifton, among the new. In order to conduct the examinations required at the close of the courses given in these colleges, the services of a considerable number of visiting examiners will be required. We doubt indeed whether, in view of the number of candidates and the variety of the courses which the colleges will offer, it would be possible to conduct the examination properly during the short period of time available for the purpose with a total staff of less than from thirty to forty visiting examiners.

44. We have considered the question of the name which should be given to this examination and suggest that it should be called the Intermediate College Examination. This title would best signify its place in the educational system and would preserve some continuity with the name of the present intermediate examination which it will replace.

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<sup>1</sup> Chapter XXXII.

45. It will be seen that the general character of the Intermediate College Examination which we propose would be in accord with that approved by the Government of India as most advantageously combining the advantages of oral and written examination.<sup>1</sup> The introduction of this method of examination will, we believe, have a healthy influence upon higher secondary education in Bengal and conduce to greater variety and interest in the methods of teaching. It is a more costly form of examination than that which consists in written papers alone. It calls for great skill and tact on the part of the visiting examiners who will conduct the oral examinations. But the concentration of intermediate training in a comparatively small number of institutions will make possible the adoption of this improved plan of examination with every hope of success.

*V.—The conduct of the high school examination.*

46. The other examination for the conduct of which the Board of Secondary and Intermediate Education will be responsible is that which will be taken by candidates at the end of the course in the high English schools and will therefore correspond to the present matriculation. It can no longer be called by that name as it will not admit successful candidates to the University. We propose that under the new conditions it should be called the High School Examination. This name will clearly mark its place in the educational system of Bengal.

47. A few high schools (and we hope that their number will increase) may ask that in their case the examination should be conducted upon a plan similar to that recommended for adoption in the case of the intermediate college examination. Such a request would be not unlikely to come from a high school to which an intermediate college was attached. We are of opinion that the Board should grant this privilege to a limited number of schools in recognition of their special excellence as places of education. Under such an arrangement, the examination would be partly oral, partly written. The school would be visited, at some time during the three months preceding the examination, by a group of visiting examiners, sufficiently large to conduct with expert knowledge an oral examination of the candi-

<sup>1</sup> Resolution on Educational Policy, 1913. See Chapter IV, para. 33 of this report.

dates in each group of studies—languages, mathematics, history, geography and science. The visiting examiners would examine the note-books and exercises written by the pupils during the preceding school year or two school years; they would review the methods followed by the teachers in the general course of introduction to science; they would conduct in the laboratories a practical test of candidates offering specific subjects in science<sup>1</sup>; they would examine the work done in the manual-training course; they would report generally upon the organisation of the school and upon its methods of teaching; and they might also (if such an arrangement were thought advisable by the Board or by the school itself) take into account the reports made by the teachers upon the work of individual candidates. In addition to this, the candidates would be required at the time of the general written examination to take in all compulsory subjects the same papers as those set to the other schools; but we think that in non-compulsory subjects a written examination, taken at the time of the visit of the visiting examiners and combined with an oral test, should relieve the candidates from that part of the later examination. There should also be an oral test in spoken English, success in it being recorded separately from the results of the compulsory written examination in English. Candidates who had thus undergone an oral examination by visiting examiners should, if successful in the high school examination as a whole, receive a distinctive certificate, upon which should be recorded the subjects in which they had submitted to an oral as well as to a written test, and the fact that they had taken the examination from a privileged school.

48. It will be observed that the conditions under which such an examination would be held must in some respects be more stringent than those of the ordinary form of high school examination. On the other hand, the candidates would have the advantage of taking their non-compulsory subjects slightly in advance of the ordinary examination. But, in spite of this advantage, the examination taken under such conditions would be more exacting than the ordinary examination. Success in it would therefore deserve a distinctive certificate which would also signify that the candidate had been taught in a school commended for the special excellence of its work and organisation. We believe that the intro-

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<sup>1</sup> Para. 70 (4) (f) below.

duction of this alternative method of conducting the high school examination would be a valuable corrective to the tendency of all very large systems of written examination to become mechanical in their methods and to repress individuality in methods of teaching. The bestowal of the privilege of this distinctive form of examination would be a suitable acknowledgment of the special excellence of a school. The hope of obtaining the privilege would be an incentive to many others. The withdrawal of it should be the penalty attached to a decline from the high standard of excellence previously reached.

49. So great would be the advantage of thus conducting the high school examination that it might be expected that we should propose its general introduction in the case of all high English schools. Our reasons for not doing so are that (1) the majority of schools are not prepared for a test so exacting; (2) the methods of conducting an oral examination by visiting examiners need to be matured gradually by experience and will more advantageously be applied by slow degrees; and (3) administrative difficulties make its immediate adoption impossible on a large scale. Some of these difficulties are especially serious in Bengal. To these administrative difficulties further reference is required.

50. There are more than 700 high schools now recognised in Bengal. In order to conduct an examination, partly oral, partly written, upon the plan which we have suggested for adoption in all intermediate colleges and in a very limited number of high English schools, it would be necessary for the Board of Secondary and Intermediate Education to send to each of these 700 schools a group of not less than three visiting examiners for a period of at least two days, and (where the number of candidates was large) for three days. In the great majority of schools it would not be possible to throw upon the present staff of teachers the responsibility of conducting the examination under the supervision of one visiting examiner. The work must be done by persons holding an independent position. And it would be impracticable to propose that in each school one visiting examiner should conduct oral and written examinations in all the subjects prescribed, because his special studies and experience would not qualify him for work so extensive in range and requiring so many branches of special knowledge for its proper and discriminating completion.

Moreover, one of the advantages of the plan lies in the advice and help which an experienced teacher, acting as visiting examiner, would be able to give in the schools thus visited to the teachers of the subjects of which he had special knowledge. It would not be possible for one man to give this practical help and guidance in a range of subjects so various as languages, mathematics, science, history and geography. Another condition of the problem is that, if a system of a combined oral and written examination were at once universally applied, these groups of visiting examiners would have to visit all the 700 schools every year (because there would every year be a new crop of candidates, each requiring individual examination) within the three months preceding the date of the general written examination common to all the candidates. A school would be put at a serious disadvantage if its pupils had to take the oral (and part of the written) examination some months before the date at which the same test would be applied to other schools. Hence it would be necessary for the central authority to send out, during a period not exceeding three months or at most 78 working days, visiting examiners (generally in groups of not less than three) to conduct examinations at more than 700 schools, each school requiring on an average a visit extending over at least two days. The wide distances which separate the schools and the slowness of communication throughout the greater part of Bengal would double the time needed for many of these visitations. Careful calculation shows that more than 100 visiting examiners would be required for the work. As the conduct of oral examinations, combined with investigation of pupils' notebooks and the giving of advice to teachers in methods of teaching, is a work requiring special experience and other qualifications, and has not hitherto been practised in Bengal, we are persuaded that it would not be possible to command in the first instance the services of so large a body of visiting examiners for these duties. Apart from the expense which an undertaking on so large a scale would involve, the need for accumulating experience by slow degrees for the development of this new method of examination points in our judgment to the advisability of a more gradual transition from the present methods of conducting this examination.

51. For all high English schools, therefore, except for a limited number distinguished by special excellence, we propose that the

plan of holding a general written examination as the sole test should be continued. Possibly it might be found convenient to divide the Presidency for the purposes of this examination into a few large areas.<sup>1</sup> The examiners resident in each area might find it more practicable to meet at some centre in the area than to travel to Calcutta. But under such an arrangement it would be necessary to have a revising and moderating committee of examiners at headquarters. For the conduct of the examination under the new conditions which we propose, the Board would doubtless wish to avail itself of the services of university teachers, from whose ranks the examiners have been drawn in the past. The experience of head masters of secondary schools, and members of their staff would also be of value to the Board in marking the papers, arrangements being made for their not seeing beforehand the papers of questions set in the examination.

#### VI.—*The requirements of the high school examination.*

52. We now turn to the consideration of the changes which it is desirable to make in the requirements of this examination, which will replace the present matriculation and will qualify successful candidates for admission not to the University but to courses of intermediate training. The statistics justify the assumption that a little over three-quarters of those who may pass the high school examination will proceed to intermediate courses. The average age at which candidates now pass the matriculation is about 18½ years. With improved teaching in the high English schools this average will be considerably reduced. Ultimately the great majority of the candidates should be ready to pass the examination between sixteen and seventeen years of age, and the most promising should pass in their sixteenth year.

53. Our witnesses are almost unanimous in urging that the course leading up to what is now called the matriculation examination should comprise a wider range of compulsory subjects. Their view is that it should not allow any candidate to ignore history or geography; that its regulations should provide for all the pupils having received some introduction to natural science; and that it should not, as at present, be so specialised as to divert the attention of school authorities and of teachers from

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<sup>1</sup> Chapter XL, paras. 47-49.

many aspects of that liberal training which should be given to all pupils in secondary schools up to 15½ or 16 years of age.<sup>1</sup>

54. What those who advocate a widening of the scope of the present matriculation really desire is a broader outlook affecting the whole course of school-work, a more generous conception of what secondary education should offer, and an awakening of the pupils' minds in directions which the schools under existing conditions generally neglect. But it is clear that these improvements would not necessarily (or, in present circumstances, probably) be secured by the simple expedient of making a few additions to the list of obligatory subjects in the examination and certainly not by prescribing two or three more examination papers for which the memorising of a text-book might be sufficient preparation. Evidently it is not merely an extension of the compulsory subjects in the examination but a change in the outlook and methods of the school that is needed if the intelligence of the pupils is to be more skilfully developed, if their powers of observation are to be quickened and trained and if they are to receive a wise introduction to natural science. What is involved in the demand for a wider range of knowledge at the age of sixteen is nothing less than a substantial improvement in the staffing and equipment of the secondary schools.

55. A large number of our witnesses think that the age at which a candidate is allowed to enter for what is now called the matriculation examination should be less rigidly fixed than is the case under the present rules.<sup>2</sup> It is urged that a test such as this should have regard to the stage of mental development reached by an intending candidate, not merely to his age as measured by the calendar. When, in the judgment of those who have taught them, candidates are ripe for the examination and when by promotion from class to class they have reached that point in the school from which the examination is appropriately taken, admission to the test should (it is urged) not be refused to them. The evidence shows that, even under present conditions, when the average age of passing the examination is nearly eighteen years and a half, the age limit of sixteen is in many cases a serious obstacle to a pupil's progress. A considerable number of promising boys are kept back and waste many valuable

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<sup>1</sup> Chapter IX, paras. 37-41; Chapter X, paras. 24-25.

<sup>2</sup> Chapter IX, paras. 88-99.

months in going over for a second or even for a third time work which they have already done. The new regulations which we shall propose for the examination are designed to provide a test of the individual capacity and attainments of pupils who have completed the course at a high English school. There is every reason to hope that, when the teaching in those schools has been improved, an average pupil will be able to finish the course at about sixteen and a half or seventeen years of age. Some pupils of exceptional promise will be ready for the examination by fifteen and a half. We recommend that, with the approval of the head master of the school, a candidate whose age is not less than fifteen on the first day of the month in which the examination is held should be allowed to present himself for it.

There are grounds for fearing that, if under present conditions the age limit were wholly abrogated, some teachers would be exposed to pressure from parents wishing their boys to be crammed up in examination subjects to the prejudice of their general education. We rely upon regular inspection and upon the improved conditions of work in the schools as safeguards against any prevalence of this evil under the less rigid regulations which we propose.

56. Each school should be expected to present for the high school examination the whole number of the pupils in the class in which that examination may be taken, and the Board should call for an explanation from the head master of the school if any appreciable number of the pupils in that class are not presented. This will prevent an unfair amount of attention being given to some of the pupils to the disadvantage of the rest. It will also deter the schools from promoting boys prematurely to the highest class. The purpose of the examination is twofold (1) to test the attainments of individual pupils, (2) to ascertain the standard reached by the class as a whole at this stage. The second of these purposes is defeated when only a selected number of pupils, chosen out of the class, are presented for the examination.

57. We recommend that geography (including physical geography) should be added to the list of compulsory subjects to be taken in the examination. This branch of study is indispensable to a good general education. But, in this subject as in all others, what is really needed is that it should be intelligently

taught. For this we are aware that an order making it compulsory in the examination will in itself be no guarantee. The true reform, the only reform which will improve the schools, is to improve the teachers. No adequate remedy for the defects in secondary education will be found unless all the schools come under the supervision of a representative central authority able to help them with funds and guidance, and to enforce proper standards of payment to teachers and of educational efficiency.

58. The teaching of science is almost entirely neglected in the secondary schools of Bengal. There are some lessons about nature in the lower classes, and mechanics is taken as a matriculation subject in a few schools but is often not effectually taught. With these exceptions, however, science is omitted from the course of study.

59. We think it necessary that the teaching of science should be introduced into every secondary school in Bengal and that some study of science should be part of the education of every pupil. At present the course of training is, in too preponderating a degree, bookish. The wider outlook which can be imparted by the skilful teaching of science, especially in questions of public health, is much to be desired. Practical work and the training of the hand are at present neglected and can be combined with the teaching of science. Under present conditions a good deal of scientific ability is left undeveloped and is perhaps permanently lost to the community. The increasing importance of technology, and the enlargement of university studies with a view to training recruits for scientific callings (as well as the provision of some technical training among the courses which we recommend for the intermediate colleges) make it necessary that the course of study in the high English schools should give the pupils some of the groundwork of scientific knowledge and at an early stage turn the thoughts of those of them who have scientific aptitude towards these branches of study. Furthermore, as scientific questions will certainly play an increasingly important part in public administration and in the agriculture and industry of Bengal, it is expedient that those who in future will be charged with responsible duties in Government service, in the management of estates and in industrial affairs should acquire at school some knowledge of elementary science and of its methods and terminology.

60. An illuminating introduction to science is the chief desideratum, though not easy to secure. We hope that one of the services which the departments of education in the Universities of Calcutta and Dacca will render to the community may be the training, in concert with the scientific departments, of a large number of teachers who will bring this educational influence into the secondary schools.<sup>1</sup> The stimulating power and intellectual value of scientific teaching in the schools will depend upon its being found possible to secure in sufficient numbers teachers who have a wide knowledge of science and the trained gift of imparting interest in it. Given the right type of teacher, the influence of the study of science in schools is great upon the mind of the pupils and may develop and fortify important elements in character. To achieve these results, a gifted and resourceful teacher requires, in the earlier stages of instruction, only simple materials and inexpensive equipment. The teaching of geography, including physical geography, is an indispensable part of the introduction to science which we think that all the pupils in secondary schools should receive. It entails in its earlier stages no very costly illustrations and apparatus, and indeed is most valuable when the pupils themselves under guidance make some of the models and maps which illustrate the lessons they receive. Again, in the study of living things, which should form a substantial part of the course of science in schools, the teacher can find in the plants and animals of the district most of the material which he and his pupils need for observation and description. It is true that laboratory accommodation and somewhat costly equipment are necessary to the more systematic instruction in the elements of physics and chemistry which, for some at any rate of its pupils, a well-organised secondary school should provide. But, as is shown by the experience of several colleges in Bengal and elsewhere, the expense of such equipment may be reduced by careful purchase and to some extent by the use of simple appliances made on the spot. Furthermore, the educational value of demonstration lessons (which a teacher can train his pupils to help him in preparing) should not be underrated.

61. But in the earlier stages of education everywhere the kind of scientific teaching which it is of fundamental importance, though most difficult, to secure is that which by vivid description opens

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<sup>1</sup> Chapter XLIII and Chapter XXXIII, paras 130-134.

the minds of children to the significance of life and its environment; which shews them by guidance and suggestion how to use their eyes; which trains them to observe accurately, to mark what is significant, to describe in words what they actually see, and to draw correctly such inferences as are within their power; which so plans its courses and chooses its topics as to give some insight into the unity of nature; which, by simple illustrations from the history of discovery, makes clear to those who are themselves beginners through how many stages of conjecture and of patient verification a theory has to pass before it can reach the simplicity of an accepted general law; which teaches the laws of health; and which aims at kindling a love of nature and of science, at forming a habit of observation and reflexion, and at initiating the mind into the processes of scientific investigation, rather than at fixing upon it ready-made the clear-cut conclusions of older minds or at loading the memory with knowledge which the learner himself has not actively made his own.

62. But this kind of teaching does not lend itself well to the test of a written examination. Its value lies in the interest which it kindles, in the turn which it gives to thought. Its operations are necessarily slow. It cannot quickly produce its best and most permanent effects. It is the antithesis of cramming. Its earlier stages are exceedingly important, yet in those stages its results cannot well be concentrated in a form which lends itself to test by a written examination.

63. How far therefore under existing conditions in Bengal, and under those likely to prevail within the next ten years, it is desirable to test the elementary science teaching by means of a compulsory written examination is a matter in regard to which it is natural that there should be some difference of opinion. There are strong reasons in favour of making an examination compulsory. In Question 9, sub-section (ii) (c) we asked for the opinion of witnesses in regard to the possibility of reducing the rigidity of the examination system by exempting particular subjects or sections of subjects from test by a formal examination; and in Chapter XVII<sup>1</sup> we have discussed the evidence on this question. The general tendency of that evidence is to show that both at the University and in the schools a subject in which no examination is held,

<sup>1</sup> Paras. 160-167.

although compulsory as part of the curriculum, will be neglected. Dr. Brajendranath Seal writes :—

“ This distinction between subjects for teaching and subjects for examination was what the framers of the new regulations had in mind in omitting English history from the matriculation curriculum and making geography and Indian history optional. The laboratory courses in physics, chemistry and other science subjects in the intermediate curriculum were treated similarly. The latter arrangement has worked fairly well, the former has broken down.”<sup>1</sup>

In regard to English history in the schools, Dr. Seal regards the result as disastrous. Mr. W. C. Wordsworth, Officiating Director of Public Instruction, says :—“ Without some kind of examination there would be no incentive to work ; as matters are in Bengal, subjects not examined in are neglected by both teachers and students, nor is there likely to be any early change in this respect.”<sup>2</sup> Mr. J. W. Gunn, Assistant Director of Public Instruction, says that the suggestion if carried into effect “ would merely extend the evils already prevalent in the schools, namely, the general neglect of all non-examination subjects.”<sup>2</sup> The evidence of several Indian witnesses, especially that of Mr. Benoy Kumar Sen and Mr. Raj Mohan Sen, is equally emphatic. “ Our students, as they now are,” writes the latter, “ will not seriously study any subject in which they are not to be examined.” Some of our witnesses think that at the university stage it might in some cases be advantageous to prescribe a subject as part of the obligatory course of study without enforcing examination in it. But no opinion has been expressed in favour of adopting this arrangement at the school stage.

64. Certain passages in the recently issued report of the Committee on ‘ the position of Natural Science in the educational system of Great Britain,’ of which Sir J. J. Thomson was Chairman, bear directly upon this question. The Committee write :—

“ We consider that it is essential that every boy should be required to satisfy the examiners both in science and in mathematics, subject to the generous

<sup>1</sup> Question 9. In the years 1916, 1917 and 1918 history was taken in the matriculation examination by 8,546, 8,744 and 7,122 candidates respectively : geography by 2,382, 2,602 and 2,644. It would be incorrect to infer that the number of pupils who have learnt geography at any stage in their school-course is limited to those who present this subject in the matriculation examination. But the teaching of geography in schools has been retarded by the somewhat exacting requirements as to equipment which are imposed or recognition in this subject.

<sup>2</sup> Question 9.

application of the principle of compensation hereinafter mentioned. In many boys' schools the teaching of mathematics throughout the school is much more developed than that of science and there will, if science is not required, be a tendency to concentrate on mathematics and to neglect the teaching of science. If teachers and boys know that, while it is necessary to pass in English subjects and in a foreign language, the omission of either mathematics or science does not involve failure in the examination, it is quite safe to predict that one or other of these subjects will receive less attention; and the subject which is the more costly to equip, and in some ways the more difficult to teach, is likely to be the one which will suffer.

To make any subject compulsory in an examination in order to guard against its neglect is not the ideal method of obtaining the best education, but in the present condition of affairs it seems to be the most efficacious means we can find.

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It is proposed in some quarters that 'in inspected schools boys should be certified by the science master as having taken a proper course and reached a satisfactory standard in science.' But we have had no satisfactory reason presented to us for the treatment of science in a different way from all other school subjects in respect to examinations, and even if such ground were shown we should still find it impossible to recommend the adoption of this plan. The inequalities of experience among teachers would render it almost impossible to attain any common standard of judgment.

It has also been suggested that inspection alone might suffice. There is, however, an essential difference between the tests provided by inspections and examination. Inspection tests the character of the curriculum, the adequacy of equipment, the competence of the staff, and the general efficiency of the work of the form; it shows what opportunities the school gives to its pupils, but it is not primarily intended to be a test of attainment of individuals.

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The examination (*i.e.*, the first secondary school examination) should be regarded as a test of satisfactory work during the pupils' school course and should be of such a character that it can be taken without any special preparation which would interfere with that course. The work of each candidate in the examination should be regarded as a whole, and the principle of compensation should be recognised both between the different groups and the different subjects of the same group. By this we mean that comparative weakness in one part of the examination should not necessarily involve failure if the candidate has done really good work in other parts.

We recommend that in the first examination there should be as close co-operation as possible between teachers and examiners. Not only should the examination be adapted to the curriculum of the particular school, but great weight should be attached to the teacher's estimate of the merits of the pupils and to their school record. An examination conducted on these lines would not have the effect often ascribed to external examinations of cramping the curriculum but would permit of all reasonable freedom of teaching.

Nor could it be fairly said to discourage either wide variation in types of curricula or liberty for educational requirements.

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Some of the defects of school courses are ascribed to the influence of external examinations in limiting the freedom of the teacher to choose his material and to treat it in the way suitable to local conditions or the special needs of his form. In all examinations, especially if they are competitive, there is a tendency to set questions of such a character that there would be no serious difference between the marking of different examiners. In an examination in elementary science the questions on general principles are admittedly more difficult to mark than those which are of the nature of little sums, such, for example, as to calculate the change in temperature when a piece of hot metal is dropped into a vessel of water. The result of this is that the questions tend to concentrate on a limited range of subjects, which are not of the highest educational value, and in which the majority of students find but little to interest them.

But examinations cannot be blamed for all the faults which have been pointed out to us; it seems certain that a great part of the difficulty arises from the fact that the teachers, from lack of training and of knowledge of the methods of other teachers, tend to go on teaching as they were taught themselves, and thus the work becomes stereotyped.

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The very last thing which we should wish is to lay down a hard-and-fast rule which would stereotype science teaching throughout the country. We think it essential that the teacher should be allowed as much freedom as possible in his choice of method and that he will probably get the best results with the one which he himself prefers. He should however realise that the power of settling for himself the particular course he adopts carries with it greater responsibility for seeing that it is the best which can be devised under the circumstances of the school."<sup>1</sup>

65. It will be seen that the Committee regard freedom for the teacher as an essential part of their scheme. In an introductory passage they indicate their general aim.

"It ought not," they say, "to be beyond the wit of man to devise a scheme of education that will be durable, yet elastic; a scheme that, while securing that every child should be equipped with a knowledge of science, will not cramp the teacher by a syllabus or even by a rigid tradition."<sup>2</sup>

It is plain however that to carry out in the 700 high English schools of Bengal examinations on the lines recommended by the British Science Committee would be impracticable within any reasonable time; an examination in which an external examiner co-operated with the teachers and took account of school records would require a staff of examiners of a magnitude, and would involve an

<sup>1</sup> The foregoing passages are taken from paras. 34-36 and 46 of the report.

<sup>2</sup> Para. 3 of the report.

expenditure in fees, in travelling allowances and in time, that exceed what is possible.

66. High school education in Bengal is too bookish and literary; and science, taught in an intelligent way, is necessary to counteract this tendency. But between the threatening Scylla of neglect and the no less threatening Charybdis of misuse of the teaching of science it is not easy to choose. One of our number (Dr. Gregory) thinks that the whole effort to introduce science teaching into the high schools will be wasted unless examination pressure is applied and that under the new conditions such pressure will be more reasonably applied in the future than in the past. The majority of us are more disposed to leave the teachers and pupils freedom, though fully aware that freedom will mean neglect in many cases, in the belief that the teaching will on the whole be more fertile in its ultimate results than if it is cramped by a set syllabus. We feel that, in its application to science, especially in the case of beginners and immature students, the defects of the examination system, admitted in England, would be accentuated in India; that precisely in dealing with this new subject, designed rather to stimulate and open the doors of the pupil's mind than to give at this stage instruction that will be of positive and practical use, it is desirable to give the teacher freedom to teach those portions of his subject in which he is most interested and in the way which interests him most; and that he will be cramped by the examination syllabus; but we feel still more that the examination paper, to a greater extent even than the syllabus, is likely to cramp the teaching and confine it to those points on which short cut-and-dried answers are possible; answers that can be memorised without involving understanding, and calculations that can be carried out by rule of thumb; in short, that the teaching, while it will nominally deal with 'science,' will in effect be unscientific, and more calculated to sterilise than to stimulate any real interest in the subject, so that money spent on equipment and teaching will be wasted or worse than wasted.

67. We are obliged therefore to recognise the fact that, under the conditions which prevail in the high schools in Bengal, it is not possible to deal with this matter in a wholly satisfactory way. We are unanimous in recommending that after a reasonable notice no pupil should be allowed to enter for the high school examina-

tion unless the head master or head mistress of the school certifies that the candidate has received a course of instruction in science extending over a period of at least two years. This would ensure the inclusion of science as a necessary part of the course of study leading up to the high school examination, and we suggest that the Board of Secondary and Intermediate Education should issue for the guidance of teachers an illustrative outline of the course or courses which it would approve for the purpose. In those selected schools which may be allowed to have the high school examination conducted by visiting examiners, in the manner which we have recommended for the intermediate examination, the candidate's work in science should be examined partly *in situ* by means of an oral test, partly by a written examination, the latter being adjusted to the course of instruction given in the school laboratories and approved by the visiting examiners. But in the remaining schools we think that there should be no compulsory examination in science until the staff of teachers of this subject has been materially strengthened and until the necessary equipment for the practical teaching of science has been provided.

The plan of introducing a compulsory written examination in science might on paper seem to enforce the study of the subject more rigorously and in a manner to which pupils, teachers and school committees would be disposed to give more respectful attention. But we should prefer to rely upon the interest of science securing for it in due time the attention and prominence which it deserves, rather than to hand over to the even graver danger of cram a branch of study which cram would completely spoil. If under present conditions every high school in Bengal had to present its pupils for examination in science, the weak and inefficient schools would inevitably set the standard of examination. The work in the good schools would be hampered by this defect.

68. History is another subject which presents special difficulties from the point of view of compulsory examination in schools. We are unanimous in thinking that it should form part of the training given to all pupils in high English schools, and find that a very considerable number of our witnesses take this view. Unfortunately however the subject is in a great number of cases ill-taught, and the result of this inferior teaching is to deaden interest in history

instead of quickening it. The remedy for this state of things must be slow. It can only be found in the work of a large number of teachers keenly interested in historical studies and trained to impart that interest to their pupils. We believe that the reorganisation of the University of Calcutta and the establishment of the University of Dacca will lead to a great development of historical studies in Bengal, and that the new departments of education which we propose for both universities will in due time send out into the schools a large body of teachers able to stimulate a love of history and to impart the habit of mind which is conducive to historical studies. The work of these teachers will gradually diffuse a new ideal of historical teaching through the schools, especially if their influence is organised through an historical association similar to that which has produced a great improvement in the teaching of history in English schools. The requirement of history as a necessary part of the course given to every pupil in the high English schools and insistence by the Board of Secondary and Intermediate Education upon this subject having an important place in the curriculum throughout the school course will increase the demand for teachers of history and give those of them who have a keen interest in their subject an opportunity of improving the present methods of teaching it. A debateable question is whether this process of reform would be accelerated or retarded by making history a compulsory subject in the high school examination. A large number of our witnesses (52 in their answers to Question 8 and 36 in their answers to Question 13) recommend that it should be made compulsory. One of our number (Dr. Gregory) agrees with this view on grounds similar to those which lead him to a like judgment with regard to the teaching of science. The majority of us think that in present circumstances it would be wiser to remain content with a change which would make history a necessary and prominent part of the course of study in all high English schools; that the inclusion of the subject among the compulsory subjects of examination would under existing conditions only extend more widely the mechanical and uninspiring methods of teaching the subject which now prevail; that any real improvement of the present state of things must spring from the work of individual teachers; and that for this reason the teachers should be left as free as possible from the restrictions of an examination syllabus. Most of the teachers would no doubt make but little use of this freedom. But

the best of them would respond to the opportunity; and their influence, upon which the hope of improvement depends, would gradually spread.

69. We think it indispensable that the standard required in mathematics in the high school examination should be raised substantially above the level now permitted in the matriculation examination.

70. It will be convenient if we now summarise our proposals with regard to the examination which will take the place of the present matriculation. We recommend that it should be called the high school examination; that to pass this examination should be an indispensable condition to admission to an intermediate college; that it is highly desirable that each school should normally present for this examination all the pupils in its highest class and that the Board should call for an explanation from the head master if any appreciable number of the pupils in that class are not presented; that the standard of the examination should correspond to the stage which would normally be reached by a pupil in an efficient school at about sixteen years of age; that a candidate who in the ordinary course of promotion has reached the stage at which the examination is taken should be allowed to enter for it, if the head master so approves, provided that his age is not less than fifteen on the first day of the month in which the examination is held; and that, except in schools which are allowed to have an examination partly conducted by visiting examiners, the high school examination should be wholly conducted by means of written papers.

We recommend<sup>1</sup> that the plan of the examination should be as follows :—

- (1) The head master should be required to certify that each candidate whom he presents for the examination has received during his training at school a course of instruction of a kind and at a stage approved by the Board, in each of the following subjects and in any subject not mentioned in this list in which the candidate submits himself for examination :—

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<sup>1</sup> Dr. Gregory thinks that all candidates should be required to offer six subjects and that the introduction to natural science should be withdrawn from (1) and added as a fifth subject under (3).

- (a) Introduction to natural science, including the teaching of elementary hygiene :
  - (b) History of India ; History of the British Empire :
  - (c) Drawing and manual training.
- (2) Every candidate should be required to present himself for examination in at least five subjects.
- (3) The following four subjects should be compulsory for all candidates :—
- (a) Vernacular :
  - (b) English :
  - (c) Elementary mathematics :
  - (d) Geography, including physical geography.
- (4) The candidate should also be required to offer himself for examination in one of the following subjects, and should be allowed in addition to this to offer a sixth subject also drawn from the following list :—
- (e) A classical language (Bengali-speaking Musalmans being allowed to offer Urdu in lieu of one of the languages ordinarily enumerated as classical) :
  - (f) An approved scientific subject (a number of alternative courses being allowed for his choice, one of these being of the nature of a general introduction to science) :
  - (g) Additional mathematics :
  - (h) History of India ; History of the British Empire.

We recommend further that the rules of the examination should require every candidate to reach a certain minimum standard in each compulsory subject ; that a certificate should be awarded to all candidates successful in the examination ; that each certificate should bear upon it the list of the subjects in which he has passed ; that the names of successful candidates should be published in two divisions (candidates who have gained two-thirds or three-fifths of the aggregate of marks in the examination being included in the first division) ; that distinction be awarded, and recorded on the certificate, in any subject in which the candidate's work reaches an exceptionally high level of excellence (as shown by his having gained, say, 75 per cent. of full marks in the subjects) ; that (subject to special excellence in one branch of study being allowed to compensate within defined limits for some degree

of failure in another) a candidate should be required to pass in all the obligatory subjects at one examination<sup>1</sup>; that a candidate who fails should be allowed to present himself at any future examination; and that a candidate who has already passed the examination should be permitted to present himself at a subsequent examination in one or more alternative additional subjects.

### VII.—*Recognition and inspection of schools.*

71. The plan which we have proposed in this chapter will entail a more exacting standard of efficiency in regard to the staffing and equipment of all recognised high English schools in Bengal. At the present time however about half of those schools subsist on the fees paid by their pupils and receive no aid from public funds. They are under private management and are liable to inspection by the University but not by the Department of Public Instruction acting on its own authority. We propose that the functions now exercised by the University in regard to the recognition and inspection of schools should be transferred to the Board of Secondary and Intermediate Education upon which the universities will have effective representation. This proposal raises two questions of principle which we will now discuss.

72. When under earlier conditions this responsibility for the recognition of schools was thrown upon the University by Government, public opinion approved the arrangement, because this duty seemed inseparable from the duty of conducting the matriculation examination over which the University itself exerted sole control. But two changes have supervened. First, the matriculation examination has by insensible degrees been required to discharge, in addition to its original function, another not less important—namely the ascertainment of the general results of high school training as imparted not only to those who are going forward to the University but also to the large number of boys who cannot or should not entertain the ambition of pursuing an academic course. Secondly, the cost of an efficient high school education is steadily rising. The need of the community for the best services which high schools can render grows more urgent year by year. The University knows what a good high school

<sup>1</sup> For a discussion of the principle of 'compensation,' which should be applied in the high school examination, see Chapter XVII, para. 80.

should provide for its pupils, but is in the painful position of knowing that hundreds of them cannot afford to provide it. Nor has it any funds out of which to make the grants-in-aid which a large proportion of the high schools badly need and which in other countries, in view of the increasing costliness of efficient education, they receive in ever larger measure from public funds.

73. Thus at present the University is trammelled by an invidious responsibility. On it rests the duty of deciding whether or not it should bestow the privilege of recognition on each new high school which springs up in response to the educational aspirations of Bengal. By granting recognition, the University attests to the public the competency of the school to give the kind of education which the community needs. By refusing recognition, it may appear to thwart the legitimate desires of a populous district. The middle course of granting provisional recognition does not carry with it any guarantee that the school will improve. Thus the University finds itself, with increasing frequency, in the dilemma of having either to block educational hopes or to give the hall-mark of its recognition to an institution which it cannot unreservedly approve.

74. The position becomes more embarrassing as time goes on. We have seen<sup>1</sup> that twelve years ago, when its present regulations were new, the University was able to effect great improvements in many schools which in the whole course of their existence had never been inspected before. But circumstances have changed. The cost of maintaining a high school according to modern standards of efficiency has risen. Hopes of increased Government grants have not been realised. The demand for high schools has become more intense. Thus the responsibility resting upon the University in regard to the recognition of high schools is heavier than ever. Its power to secure effective improvement in secondary education has relatively declined. Such a false position becomes increasingly irksome as the need for reforms in the high schools grows more urgent. Yet we cannot entertain any hope that, if the present conditions continue, this false position will be relieved. Already, as our evidence shows, the existing arrangements lead to misunderstandings and even to friction. None of its varied duties can

<sup>1</sup> Chapter X, para. 10.

cause the Syndicate greater anxiety than the discharge of its responsibilities towards the secondary education of Bengal. The volume of these responsibilities is great. Questions connected with the conduct of the matriculation and with the recognition of schools occupy more than half of the time which it devotes to the business of the University.<sup>1</sup>

75. But a connexion between the University and the schools from which it draws its students should be carefully preserved. It is in the University that many of the most-promising of the boys whom the schools are training will complete their studies. Their future proficiency in those studies depends in a considerable degree upon the training which the school must begin. The University therefore should have a voice in deciding what schools should teach, just as representatives of the schools should have a voice in deciding what the University should require. The University should have some influence in determining the scope of the examinations by which school boys are tested, just as representatives of the schools should have a share in confirming the general principles by which the university examinations are framed. From this point of view, it is necessary to qualify in some degree the words in which the Indian Universities Commission of 1902 expressed their conclusion that "the conduct of a school final or other school examination should be regarded as outside the functions of a university."<sup>2</sup> In the conduct of such examinations, the University should, in our judgment, have direct influence. But to the sole management of such examinations it has no claim. Other interests are concerned besides the University's interests; other forms of experience, besides the experience of the University, should be blended in the authority which controls them. Nor, on the other hand, is it sufficient to say "all that unaided private schools want is recognition by the University, so that they may send up their students as candidates for the university entrance examination; and, for that purpose, all that the University is called upon to ascertain is that they are well-conducted institutions, are efficient in teaching up to the entrance examination standard and are not injurious to the interests of discipline."<sup>3</sup> Even if we were to

<sup>1</sup> Chapter XXVII, para. 57.

<sup>2</sup> Indian Universities Commission, 1902, Report, page 69.

<sup>3</sup> *Ibid.*, note of dissent, page 80.

assume that the University is able effectively to ascertain all that should be known on these points, and even if we were to grant that it is in a position not only to ascertain that the schools are well-conducted and efficient at the time when they apply for recognition, but to ensure their continuing in that state, we should feel that these words touch only some aspects of a many-sided problem. A high school is by its nature necessarily more than a nursery to the University. It is part of the educational system of the country. It has an obligation to the whole community, not merely to the boys whom it trains or to the parents whose fees are paid to it. Private or public, it cannot evade this evident obligation. The decision as to what it should teach is not legitimately governed by its own predilections alone, nor alone by the predilections of the parents, nor by the demands of the University alone. All these indeed are in different degrees pertinent to the issue. But transcending them all, though not necessarily in conflict with them, is the interest of the community as a whole. The interest of the community is inseparably involved in the work of every school, and especially in that of schools which receive a formal recognition implying a guarantee of fitness for the work which they propose to do. The community, in safeguarding its interests, needs to look wider afield than to the entrance examination of the University alone.

76. Education, however important to the individual and therefore rightly adjusted to individual requirements, is also a matter of public concern and therefore calls for incessant re-adjustment to public needs. For this reason we have recommended the establishment of a Board of Secondary and Intermediate Education so representative in character as to reflect the needs of the community, but not so unwieldy in size as to be ineffective in the work of administration. If such a representative Board is established, the experience of the University will find effective expression in its policy and administration. To such a Board we recommend that in future the responsibility of the University for the recognition of schools should be transferred.

77. The second question of principle which arises is whether unaided high schools which are under the management of private bodies should be required to come under the supervision of a central authority so constituted as to represent the whole community.

The unusually large number of privately managed schools in the Presidency makes this a question of considerable practical importance to the future welfare of the University and of all other parts of higher education in Bengal.

78. The whole community is concerned in the work of secondary schools as upon their excellence its general welfare depends to a considerable degree. All secondary schools therefore, which desire to be recognised as part of the national system of education, should be under the supervision of a representative public authority, whatever be the sources of their income and whatever the characteristics of the management by which they are controlled. It is essential that the public authority charged with the duty of their supervision should be one in whose expert knowledge, judgment and impartiality confidence may be reposed. This authority will find it necessary to exercise its supervision by means of inspection and of examination, though part of the work both of inspection and of examination may be delegated to some approved authority or authorities, provided always that the community takes guarantees that the duties so delegated are wisely and efficiently discharged. It is essential that inspection should allow freedom for varieties of method in teaching, of school organisation and of arranging courses of study, subject to the requirement of minima fixed in the public interest and liable to constant criticism and review. The importance of securing such freedom is due to the fact that the science and art of education are progressive, and the needs of the community diverse. It is equally essential that the examination of individual pupils should be so conducted as not to overstrain them or to interfere with their normal development. Lastly, in the interests of the community, the State is under obligation to assure itself that the teaching and influence of the schools are not inimical to public order, and that no school harbours elements which menace civil peace. But, though the State may at times find that the protection of the community from the dangers of subversive propaganda or of outrage may compel it to have regard to the educational work of schools, it is desirable that educational inspection and police supervision should be kept wholly distinct.

79. In Bengal in 1916-17 there were fourteen high schools under the management of private bodies to every high school under the management of Government or of municipalities. On March

31st, 1917, the number of boys and girls in all the provinces of British India studying in high schools which were in receipt of aid from public funds was 70·8 per cent. of the total number of pupils in high schools of every type. But in Bengal the corresponding percentage on the same day was only 45·6 per cent. Thus in British India as a whole, out of every ten boys and girls receiving a high school education nearly seven were in schools which are inspected and aided. In Bengal out of every ten boys and girls receiving a high school education more than five were in schools which receive no aid from the State.

80. Historical reasons explain the extent of private enterprise in secondary education in Bengal. As we have shown in an earlier chapter<sup>1</sup>, the Government emphasised the value of private initiative in education and on principle encouraged it. Its policy was to bring 'in all its degrees under efficient inspection' a system in which Government agency or aid should be combined with private exertion and liberality<sup>2</sup>. In no part of India was the soil readier for the growth of such a policy than in Bengal. The private secondary schools of the Presidency have claim to guidance and aid because they are the outcome of a public policy long and deliberately pursued.

81. That policy rested upon two distinct foundations. The first was the conviction that education, and especially secondary education, should not all be cast in one mould, even though that mould were fixed by the Government. The second was an assumption that secondary education could in most cases be kept efficient by means of the fees paid by pupils receiving it. The conviction that freedom of educational initiative should be preserved has been justified by experience. The assumption that secondary education can normally be self-supporting has proved unsound.

82. Private initiative in education has in the past rendered great service to religion, to culture and to trade and is likely to prove of great value in the future. But it has never yet sufficed to meet all public needs. It can originate a movement of educational ideas. It can protect the convictions of a minority. But it cannot supply a whole people with a system of schools. And it is peculiarly

<sup>1</sup> Chapter IV.

<sup>2</sup> Despatch from the Court of Directors of the East India Company on the subject of the education of the people of India, July 10th, 1854, paras. 47 and 51.

liable to succumb to the temptation of regarding immediate profit as the criterion of success. If private schools have produced some of the best things in education, they have also been responsible for some of the worst. Some private enterprise is illustrious in educational history ; much of it is dull, inert and mechanical ; some of it is a by-word and a scandal. The problem is how to preserve it as a source of new ideas without allowing it to deprive the community of the educational opportunities which the community's collective power can provide more adequately in other ways.

83. Privately managed high schools in Bengal are straitened in income, and partly for this reason are also straitened in their ideas of educational excellence. Unfortunately the percentage of privately managed high schools receiving subsidy from public funds has declined during the last five years. In 1911-12 it was 40 per cent. of the total of high schools ; in 1916-17 it was 37 per cent. Financial aid of a substantial kind is needed in order to enable the high schools to serve the interests of the community. As the University is necessarily not in a position to extend financial aid to the secondary schools, we propose that the latter should be enabled to receive it by coming under the guidance and supervision of the Board of Secondary and Intermediate Education which would be in a position to make liberal grants and in which the influence and experience of the University would be merged. The secondary schools would remain under a supervising authority ; the University would be effectively represented upon the Board to which its responsibility for the recognition of schools should be transferred ; and the Board by reason of its fully representative character and its special relation to Government would be able to give to the struggling secondary schools the financial assistance which they need and without which they cannot provide a liberal education.

— 84. We have found that the chief defect in the high schools in Bengal lies in the insufficient professional qualifications of the vast majority of their teachers. This weakness, though noticeable in the schools under Government management, is conspicuous in the private schools. As a foundation for efficiency, there should be less disparity between the private and the Governmental schools. For improvement in the salaries and prospects of the teachers and for the allocation of grants from public funds, all the high schools

should be encouraged to come into relation with the central authority which will represent the State.

*VIII.—The recruitment and position of teachers in intermediate colleges and high English schools.*

85. One of the happiest results which we hope would arise from the mode of organisation we are proposing would be a growing unification among the different types of schools which now exist in Bengal, but a unification which would allow for and encourage variety of type and individual initiative. At present there is too sharp an administrative cleavage between Government schools and colleges on the one hand, and private schools and colleges on the other; and between these two types there is little or no co-operation or interchange of teachers. Under the general direction of a central authority or representative Board, it is reasonable to expect that this cleavage would diminish, without in the least undermining the freedom of the private schools or of the State schools to try experiments and to adapt themselves to the needs of their localities.

86. But any such process of unification must depend upon the modes in which teachers are recruited, and the extent to which it is made possible for them to transfer their services from a school or college of one type to a school or college of another type. A reorganisation of the methods of recruiting and paying teachers is, indeed, urgently needed in any case, for the sake of efficiency. And it is in our view essential that any new system should consider the needs of the high schools and of the intermediate colleges together, and should make transfers or promotions easy, not only from private to Government schools or colleges and *vice versa*, but from high school work to intermediate work.

87. There are at present two distinct methods of recruitment, one for Government schools, the other for private schools; and this distinction is one of the main causes of cleavage between the two types of schools. In the privately managed schools teaching-posts are filled by the authorities of the school on such conditions as to salary and tenure as they find sufficient to attract the kind of men they need or think adequate for their purpose. But the teachers have no security of tenure, there is no fixed salary scale—the salaries, as a rule, being so inadequate that most teachers have

to resort to private coaching to eke out a livelihood—and at the end of their service, however long and faithful it may have been, the teachers cannot, as a rule, look forward to any pension or superannuation allowance. In Government schools, on the other hand, the teachers are appointed, not by the governing body of the school, but by Government. They become members of one or other of the educational services. If their salaries are unduly low (as, in most cases, they undoubtedly are) they have at least security of tenure and the prospect of a pension. It is because of this security and of these prospects and the social distinction which they reflect that Government service is mainly preferred. But it has its drawbacks. Promotion in a large heterogeneous service is generally by seniority, and therefore progress is necessarily slow. The ablest and most zealous young man knows that he has no prospect of rapid promotion, such as he may sometimes obtain in the better private schools. His zeal and his ambition are discouraged by this absence of prospects which, combined with the unattractive salaries, undoubtedly debars many able young men from entering upon educational work.

58. In our judgment it is necessary, if there is to be real educational progress in Bengal, that the sharp cleavage between the two forms of recruitment, and the consequent cleavage between the two types of schools which results from it, should be brought to an end; and that, at the same time the characteristic defects of each form of recruitment should be amended. The system of recruitment in Government schools ought to be more elastic; the system of recruitment in private schools ought to offer greater security and better prospects; and both should be so linked that the able and ambitious young man who begins his career in either type of school should be able to feel that by hard and good work he can make a career for himself. Above all it should be made possible to arrange an interchange of experience between the two types of schools. At present a teacher of long experience in even the best of private schools cannot well be transferred to the service of a Government school, because this would mean that he must begin at the bottom of the scale of promotion. On the other hand, it is only in exceptional cases that a private school can obtain the services of a teacher who has had experience in a Government school or college, because, in order to make such a

transfer, the teacher would have to leave the service, and sacrifice his chances of promotion and pension.

89. We are far from undervaluing the benefits which the system of Government service has brought to secondary education in Bengal and we realise the tenacity of the hold which the system has upon the public mind. We do not believe that it can be discarded immediately or until there are signs of the growth of a much stronger professional feeling among the teachers. But we feel nevertheless that the system is in many respects inappropriate to school work, and, in its present form, an obstacle to the proper co-ordination of the whole school system. If the only alternative to the service system was a system open to such grave abuses as we have found in some of the privately managed schools, we should scarcely venture to recommend its ultimate abandonment. But we believe it is possible to devise a system which will retain the chief merits, while avoiding the defects, of the present service system; which would render possible the enlistment of as many European teachers as might be found necessary in a far more elastic way than is now possible, and without making the somewhat invidious racial distinctions which now arouse much dissatisfaction; and which would at the same time bring about a real unification of the teaching profession as a whole, and open to young teachers in all schools the prospect of a career such as might tempt men of ability into this vitally important sphere of public service. Ultimately, of course, it can only be by large expenditure upon salaries that a sufficient supply of men of the right type can be obtained. But even if large funds were made available, they would not bring about the best results while the present system survived.

90. We recommend that, at the earliest practicable date, and (of course) with the fullest safeguards for the actual and prospective rights of existing members of the services, the present methods of recruiting teachers should be changed, and that, in their place, the following methods should be adopted.

91. (i) In all schools and intermediate colleges under the direct management of the Board—and these would include all schools and colleges at present maintained and controlled by Government, as well as any which may in future be established by Government or by the Board of Secondary and Intermediate Education acting in its behalf—a *minimum* commencing salary (and, if thought

desirable, a regular rate of increment) should be fixed from time to time for every post in the school or college, from the head-mastership or principalship downwards. In the event of a vacancy in any of these posts, all qualified persons, without distinction of race, or of length of service, and whether previously engaged in teaching in institutions under the Board or not, should be eligible for appointment. The aim should be to make the appointment best suited to the existing needs of the institution, without regard to any other consideration. Every teacher should be appointed on a written contract which should give him (after a probationary period, in the case of untried teachers) security of tenure for a defined term so long as his conduct remained satisfactory. In the event of unfair dismissal, or of breach of contract he should have by the terms of his agreement the right of appeal to a tribunal constituted specially for this purpose. This tribunal should be constituted by Government and should have authority to award compensation. Acceptance of an appointment should not in any way restrict the freedom of a teacher to seek subsequently another appointment elsewhere in any school or college, public or private, under the jurisdiction of the Board, without sacrificing any of his rights; nor should he be liable to transfer without his own consent.<sup>1</sup> Existing members of the educational services would stand their chance with other candidates for the vacancy. If a member of one of the educational services were chosen for the post, he should be given the choice of either retaining his status in the service at service rates of pay and pension (which might be less or more than the pay and prospects of the post to which he was appointed) or of withdrawing from the service and taking his chance with the pay and prospects afforded by the new system. In some cases it might be found desirable to appoint to a particular vacancy a European-trained teacher recruited in the manner to be described later. In that case his pay would be that fixed by his contract when recruited; but even if this were higher (as it might often be) than the normal rate of pay for the post, this should give him no special privilege or claim to superiority over his colleagues.

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<sup>1</sup> These conditions would not apply to members of the corps of teachers proposed in paras. 99-104 below.

92. (ii) In the case of private schools recognised but unaided from public funds, it should be made a condition of recognition that rates of salary be defined for every teaching post in the school. In the case of aided private schools, the Board should make it a condition of the grant that a minimum salary be assigned to each post. The minima thus defined might be less in schools aided by the Board than in schools controlled by it. But in all cases, it should be a condition of recognition that the teacher's terms of appointment should be embodied in a written contract, a copy of which should be deposited with the Board; and that he should have a right of appeal in case of breach of contract to the tribunal mentioned above, the governing body agreeing to abide by its decision.

93. (iii) In place of the pension system, which is now confined to teachers appointed under the conditions of Government service and restricts their freedom to transfer themselves from posts in Government schools and colleges to posts in non-Governmental institutions, and in order to extend the advantages of assured retiring allowances to teachers in aided or recognised intermediate colleges and schools, we propose the establishment of a superannuation fund open to the whole profession of teachers in intermediate colleges and high English schools, membership of the fund being obligatory in the case of members of the staffs of Government and of aided schools and open (with the concurrence of the school authorities) to teachers in all other recognised high schools and intermediate colleges. This change will, if accompanied by a substantial annual grant from Government, secure an improvement in the prospects of a very large number of teachers who are excluded from the advantages of the present pension system and will remove one of the chief barriers to the mobility of teaching power in Bengal. We propose that the Government should make a substantial annual grant to the superannuation fund, as one of its contributions to education in the Presidency.<sup>1</sup> We recommend that in all Government schools and intermediate colleges, and in all aided schools and intermediate colleges, it should be one of the conditions of appointment that the teacher should subscribe a fixed percentage of his salary to a superannuation fund, the Board (or

<sup>1</sup> The superannuation system, as it gradually superseded the present system of pensions, would relieve the Government from some of the liabilities which are incurred by it under the existing arrangements.

the governing body in the case of the aided schools) contributing an equal or a greater amount; the proportion contributed by the employing authority might be greater in the case of the Board than in other cases. Unaided schools or intermediate colleges, recognised by the Board, should be entitled and encouraged to come into the scheme. All contributions to the superannuation fund should be paid regularly to the Board by the authorities of the school or college, in the name of the teacher concerned; and the Board should be responsible for the investment and management of the fund, possibly through approved insurance companies, and for the addition of the annual interest due to the account standing to the credit of each beneficiary.

94. It would be possible to allow every teacher on entering the superannuation system to make his choice between various kinds of benefit which would accrue to him on reaching the age fixed for retirement (*e.g.*, an annual income for the rest of his life or a lump sum for investment). Teachers withdrawing from the profession at an earlier age should be entitled either to a paid-up policy maturing at a future date or to the repayment of the aggregate of their own contributions with compound interest. If a teacher should retire before the normal age after having served satisfactorily for more than a minimum term of years, a part at any rate of the contributions which had been paid in respect of his services by the authorities of his school should be added to the sum payable to him.

95. Under this system of appointments and of superannuation allowances there would be no obstacle to the transfer of a teacher from one type of institution to another. The teacher would not sacrifice by such transfer his claim to his superannuation allowance; the fund accumulated in his name would grow more rapidly if he were appointed in a more highly paid post, but otherwise he would be unaffected.

96. Ultimately it might be found desirable to apply the same methods in the case of the administrative and inspecting officers of the Department of Public Instruction, by allotting to each post, from the Directorship downwards, a stated salary, and securing full freedom, in making appointments to any of these posts, either to bring in a new man, or to appoint some one already engaged in the service of the Board. But we do not suggest

that the new system should, for the present, be applied in this sphere.

97. The system here outlined gets rid, so far as the main body of the teaching profession is concerned, of the inelasticity of the existing system. It gives assured tenure in accordance with the conditions of the contract as to which the teacher may enter. It leaves open the possibility of a considerable variation between the rates of pay in the private schools and intermediate colleges, and those in the State schools and intermediate colleges; but at the same time it makes possible an easy transfer from the one kind of work to the other. It would go far to turn the teaching profession in Bengal into a unified and organised profession. It avoids invidious and rigid distinctions. It opens to every teacher who can prove his capacity, and the improved methods of school inspection and examination will give him increased opportunity of doing so, the possibility of quicker promotion to the highest form of educational work for which his abilities and attainments may fit him.

98. Thus, a young graduate might begin his work in a privately managed school, encouraged to accept a low salary and a small contribution to his superannuation fund by the knowledge that various openings would offer later. He does good work; on the strength of which he is appointed to a post in one of the Board's schools, with a better salary and a consequent increase in the rate at which his superannuation fund grows. If he feels tempted to leave scholastic work, he can take with him a paid-up policy which will mature at a future date or he can withdraw his own superannuation contribution with compound interest—a useful nest egg. But if he goes on with educational work, he may possibly be invited to accept the head mastership of a private school which needs reorganisation, at a higher salary. His superannuation fund therefore grows more rapidly. With his varied experience he may be able to bring about a great improvement of his school; an improvement so marked that he may be asked (for example) to take charge of the training of teachers in a State intermediate college. From that he may pass to be an inspector or examiner of schools; he may return to one of the intermediate colleges as principal; if he has done scholarly work, he may be elected to a chair in one of the universities; if his strength is on the administrative side,

he may rise to be Director of Public Instruction. A career is open to him; a career such as is now quite impossible for a Bengali youth of ambition and ability who undertakes educational work. The lack of the stimulus afforded by the prospect of such a career reacts unhappily on all his work, and is one of the main reasons why men of ability and ambition avoid school work.

99. Ultimately it will no doubt be possible to get all the work of the schools done by teachers recruited in this way. But that time has not yet come. Bengal cannot depend wholly upon her own resources for the great improvement and development of secondary and higher secondary education which she needs. She has not enough trained teachers. She has not enough men and women capable of training teachers efficiently. Her schools and colleges have got into a bad tradition of teaching, and need to be helped out of it. Mere assertions that the methods of teaching must be improved are not enough. Men and women must be brought in who have experience of other methods, and can show how to work them.<sup>1</sup> Again, Bengal needs better teaching of English, and for that purpose English-speaking men and women who are trained teachers are required in larger numbers, especially for work at the intermediate stage. There is need for training in the phonetic method of teaching languages. There is need for more teachers acquainted with modern methods of teaching science.

100. Such teachers, because in many cases they are brought from a great distance to live in unfamiliar surroundings, and in other cases have been put to great expense, must be paid more than it would be necessary to offer to qualified residents, if such were available, for the same kind of work, and more than they would themselves receive for the same kind of work at home. The problem is to devise a means of enlisting this necessary aid without dislocating the ordinary methods of recruitment, without introducing invidious distinctions, and without establishing a claim to superiority based upon superiority of pay. It has been one of the principal drawbacks of the present service mode of recruitment that it has been attended by these disadvantages. Some of the features of the service system, and above all good pay and security of tenure, are necessary if the right kind of men and women are to

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<sup>1</sup> Chapter XLIII, para. 43, for reforms needed in the methods of class teaching.

be persuaded to give up their careers elsewhere. But other features of the service system—the uniformity of its terms and of its methods of promotion, and the reservation of particular posts to be held by members of each branch of the service—are not only unnecessary, but are unfavourable to the best use of such a corps of helpers from the West as Bengal needs.

101. A body of teachers imported from the West would, in fact, be of greatest use if they did not have special posts reserved for them, but were organised as a sort of head-quarters corps, ready to be sent wherever they were most needed, at the direction of the Board, and equally available for service in State or in private institutions. Groups among them, for example a group of teachers of educational method, or of physical training, might require more or less the same training, and therefore receive more or less the same salary. But some of the members of the corps ought to be engaged on special terms, and some for a short period. There should therefore be no such rigid uniformity in the terms of their appointment as the present service system enjoins. And they should have no claim to superiority on the ground of their higher pay; nor should they have any claim to any particular post, such as a principalship. They should be essentially an auxiliary corps, distinct from, but supplementary to, the normal staffs of the schools and intermediate colleges. These desiderata imply that they should not be organised on the basis of the existing educational services.

102. We recommend, therefore, the creation of a special corps of teachers, to be appointed on the express ground that (whether themselves Indians or Europeans) they can make a contribution of special value to the educational methods of Bengal owing to their training in, and experience of, the educational methods of other countries. Some of them might be appointed for a short term, others for the whole duration of their working life. The rates of pay and (if necessary) of pension should be fixed in each case in view of the kind of man or woman desired. The appointments should of course be held under a definite guarantee from Government. The Government of India might give invaluable aid in obtaining the right kind of candidates<sup>1</sup>; and this would especially be the case if other provinces should adopt the same

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<sup>1</sup> Chapter I.

method. Not only would a wasteful competition between provinces be avoided, but it would often be possible to arrange for transfers from one province to another. But we do not suggest that the Government of India should itself make the appointments, or maintain a corps of teachers for the whole of India. In Bengal the Government acting through the Board of Secondary and Intermediate Education should have freedom not only in making the appointments, but in varying their number and character as the needs of the educational system might demand. In some cases there might be a stipulation that the candidates, if British, should have received some training in such an institution as the London School of Oriental Studies, or arrangements might be made to pay the cost of such a course for a suitable man or woman. In other cases a promising Indian teacher, selected because he had already done good work under the Board, might be sent to Britain or America to study in a particular training institution. What is needed is the greatest possible elasticity; and this means a freedom in fixing the salary and conditions for any particular appointment such as no formal service system would permit.

103. The work to be done by members of the special corps would be fixed by the Board. Many of them would be employed in teaching English, or the methods of teaching, or some of the more neglected sciences, like zoology, in the intermediate colleges. They might, in special cases, be called upon to act as head masters or principals, though this would not be a matter of right. Yet others might be lent to privately managed schools or intermediate colleges if these institutions applied for their services, and this would form a very effective way of aiding non-governmental colleges and schools. Others (for example a special teacher of phonetics or of physical instruction, brought out for a year or two) might pass from one intermediate college to another, spending a short period in each. Yet others might be called upon to act as inspectors, or to take part in the examination of schools.

104. We believe that a body of this kind is essential if the reorganisation of secondary and higher secondary education in Bengal is to be efficiently carried out. But we also believe that it must fail of its purpose if its members are all of a uniform type, paid in a uniform way, or if they are given any reason to suppose that any

particular posts belong to them by right, or if, whatever special arrangements may be made with them in regard to salary, etc., they are encouraged to regard themselves as in any way the superiors of their colleagues in the ordinary teaching service whom they are brought out to supplement and assist. And in our judgment it is only by a frank departure from the service system as hitherto worked that these ends can be secured.

105. The educational needs of Bengal, then, can in our opinion best be met by a clear definition of two different types of teachers who are required : *viz.*, the great body of the ordinary teaching profession, who will, more and more as time goes on, be able to undertake the whole or almost the whole of the work ; and a special corps of specially trained teachers brought in to give help in a variety of ways during a period of transition. The first group, forming the main body of the profession, should be so organised as to render the transference of a teacher from one type of institution to another, possible and easy, and to place before every young acolyte of the profession the possibility of a career whose success will be determined only by his own abilities. The second group should be organised with the utmost elasticity, not as a specially privileged body, but as an auxiliary corps of helpers with experience gained outside Bengal, whose services could be readily employed wherever they may be most needed. But it must be obvious that no such system could be made to work satisfactorily, in regard to either group of teachers, unless all the schools, public and private alike, were placed under the direction of a central authority, fully in touch with the work of all of them, aware of good work wherever it was being carried on, and looked to by every school for guidance and help, without any such interference as would impair legitimate freedom.

#### *IX.—The aims of secondary education.*

106. In order to define more clearly the benefit which the community would receive from a great improvement in its secondary schools, we will attempt a short description of the liberal education which they should endeavour to provide. But we hope that, in doing so, we may not be thought to underrate the distance which in education everywhere separates the actual from the ideal. It is seldom the lot of a teacher to come near the achievement of his highest aims. As rarely can a school impart to its scholars all

that at its best a liberal education implies. But by unselfishness and patience a teacher becomes the channel through which his pupils learn more than he dared hope to give. And, with the help of a right spirit among its governors and staff, a school, even though hampered by lack of means, may communicate in the simplest form but nevertheless with great power over mind and character the essential qualities of a good education.

107. Such an education should be given under conditions favourable to the health of the pupils. Their bodies should be developed and trained by systematic and vigorous exercise. Their eyes should be trained to see, their ears to hear, with quick and sure discrimination. Their sense of beauty should be awakened, and they should be taught to express it by music and by movement, and through line and colour. Their hands should be trained to skilful use. Their will should be kindled by an ideal and hardened by a discipline enjoining self-control. They should learn to express themselves accurately and simply in their mother tongue and, in India, in English also. Through mathematics, they should learn the relations of forms and of numbers. Through history and literature they should learn something of the records of the past; what the human race (and not least their fellow-countrymen) have achieved; and how the great poets and sages have interpreted the experience of life. Their education should further demand from them some study of nature and should set them in the way of realising both the amount and the quality of evidence which a valid induction requires. Besides this it should open windows in their mind, so that they may see wide perspectives of history and of human thought. But it should also, by the enforcement of accuracy and steady work, teach them by what toil and patience men have to make their way along the road to truth. Above all, the education should endeavour to give them, by such methods and influences as it is free to use, a sure hold upon the principles of right and wrong and should teach them to apply those principles in their conduct. Thus its chief work is to enlighten and practise the conscience, both the moral conscience and the intellectual. And, through the activities of corporate life in the school, it should give the pupils experience in bearing responsibility, in organisation, and in working with others for public ends, whether in leadership or in submission to the common will.

108. When however we pass in review the present state of secondary education in Bengal, we are compelled regretfully to acknowledge that very few of the schools are giving even the bare essentials of a liberal education. In the great majority of them, physique and health are neglected; there is no training of the hand; the study of nature is practically ignored; the aesthetic and emotional sides of a boy's nature are disregarded; corporate life is meagre: training through responsibility is generally undeveloped; little guidance is given as to right and wrong; methods of class teaching are crude and clumsy. In most schools English, the vernacular, mathematics, history are badly taught. Such a state of things injures the interests of all the boys whether they are going forward to the University or not. It is hurtful to the whole community, which suffers from the failure of the schools to develope and train the powers of the younger generation. And the mischief is not lessened by the flux of time. On the contrary, apart from the efforts of exceptionally gifted men and women, it tends to deteriorate under the difficulties caused by increasing numbers of pupils in the schools and by the inexperience of the teachers. Four-fifths of the members of the staffs have nothing better to guide them in their work than recollections of the methods which were employed when they themselves were boys at school. We are thus driven to the conclusion that the inadequacy of the great majority of the secondary schools injures the University and is one of the gravest defects in the educational system of Bengal.

109. But the task of reforming the hundreds of high schools from which the University draws its students within the area of Bengal will be enormous and necessarily slow. We propose that the difficulty should be met by bringing it within manageable limits. This can be done by furnishing the Presidency with what it does not at present possess, and badly needs, a system of higher secondary education. To provide such a system would not be unduly expensive. The establishment of the new institutions, bearing the name of intermediate colleges, need not occupy more than five years. At the end of that time the University would be surrounded by a circle of efficient higher secondary institutions from which it would draw (with minor exceptions) the whole body of its students.

110. Though such a remodelling and development of higher secondary education in Bengal would entail the giving up of the intermediate classes now under its immediate jurisdiction, the University would greatly gain by the change. In the course of its advance and natural growth the University of Calcutta has passed through the same experience as many of the universities of the West. For a long time it has had perforce to undertake, as part of its duty, work which is proper not to a university but to higher secondary schools. At first this was inevitable because there were no other institutions to which the care of this preliminary training could be assigned. But as the departments of more advanced teaching, which are its prerogative and true concern, have grown and developed, the elementary courses prefixed to them have gradually become inappropriate to the organisation of the University. What was at first a convenience has become an anachronism. The more fully the University enters upon its right province in higher education, the more anomalous does this appendage of elementary classes become. This has been the experience of many universities in the West, and the University of Calcutta has now reached the stage at which its introductory (or as they are called, its intermediate) courses may wisely be discarded and be allowed to pass into the sphere of higher secondary education. To this they fitly belong, because of the age of the students concerned, the standard of attainment which they have reached, and the kind of teaching and guidance which they require.

111. The establishment of the system of intermediate colleges which we shall propose in the next chapter would furnish Bengal for the first time with opportunities of higher secondary education adapted to the needs of industry, commerce and agriculture as well as of professional callings, and would increase the wealth of the Presidency by enhancing the intellectual vigour of the elite of the rising generation and their power of initiative. It would thus in due time lessen the burden of poverty which now weighs upon the educated classes. Prospects of well-paid and responsible employment would improve. The congestion caused by the concentration of ability upon a too restricted number of careers would be relieved. The mischief which is being done by unsuitable forms of teaching and by a not less unsuitable method of examination would be checked at one of

the most critical points in a student's course. The University, released from the responsibility of giving instruction to boys still immature for the training which it is the true function of a university to provide, would find its growth no longer hampered by inappropriate duties and would be free to seize the great opportunities which lie open before it.

112. The establishment of intermediate colleges, giving higher secondary education under sound conditions of staffing and equipment, would bring a new and powerful agency for improvement into the educational system of Bengal. For the first time a good standard of school teaching would be conspicuously set up. And it would be planted at the place in the system from which it would exert the greatest influence. The corporate life, class discipline and teaching methods of the intermediate colleges would, if the latter were strongly staffed and adequately equipped, diffuse gradually throughout the province a new and more exacting view of what a secondary school should be and do. Those secondary schools which are already good would enjoy increasing public appreciation. Parents, seeing what the new intermediate colleges did for their older sons, would ask that the high schools should be improved in order that the younger boys also might enjoy the benefit of better teaching and of healthier conditions of school life. Governing bodies of secondary schools would realise that new standards were coming into vogue. The leaven of new educational ideas would be at work throughout the cultivated classes in Bengal and would affect the outlook of other sections of the community, indirectly with benefit to the primary schools.

## CHAPTER XXXII.

### THE INTERMEDIATE COLLEGES.

#### I.

1. In the last chapter we have argued that the right development of university work demands a reorganisation of higher secondary education ; and that for this purpose it is necessary that the work now done in the intermediate classes of the University should be transferred to institutions of a new type, to be known as intermediate colleges, to be organised and conducted according to the methods appropriate for school work, to be distributed over every part of Bengal, and to be placed under the same general direction as the high English schools. This change is not only necessary as a means of providing more adequate preparation for university work for those of the students in the intermediate classes who will proceed to degree courses ; it is still more necessary to meet the needs of those who will go no further than the intermediate stage and who require more carefully differentiated courses of study than are now offered to them. It is necessary for yet a third reason, as the best practical means of relieving the congestion caused by the crowding of young and immature students into Calcutta, and of helping to mitigate the evils and dangers which result from this, and which we have described in Chapter XIX.

2. For these reasons we regard the proposals to institute intermediate colleges as the very pivot of our whole scheme of reform ; and we therefore propose, in the present chapter, to explain the work which the intermediate colleges ought to undertake, in fuller detail than the plan of the last chapter permitted.

3. We have already discussed the organisation of the teaching staffs both for the high schools and the intermediate colleges, and shown that the reforms which seem to be demanded by the circumstances can, in our judgment, only be carried out under the administration of a central authority which will exercise supervisory powers over both public and private institutions, whether high schools or intermediate colleges. In our judgment it is essential

that, at any rate during the next few years, the great majority of the intermediate colleges should be provided and directly controlled by the central authority, partly because their cost<sup>1</sup> will be so substantial that it is unlikely that private bodies will be able to make themselves financially responsible; at any rate for more than a part of the cost; but mainly because the character of the work to be done by the new institutions is of such vital importance, and needs such careful guidance, that until they are well established and sound traditions have been formed, the policy and curricula should be directed by an efficient central body. At the same time we regard it as important that every intermediate college should have a local committee of management, including the principal and some of the teachers. This committee could make recommendations to the central authority, and it might in time be allowed an increasing freedom of action in certain directions.

4. The first problem which must face the organisers of the new system is the way in which the proposed intermediate colleges are to be brought into existence, and their relations with the existing high schools, as well as with those colleges of the University in which intermediate work is now carried on. As will have been made clear in the last chapter, we attach great importance to the creation of a close link between the new institutions and the high schools; only so will the influence of the intermediate colleges in developing improved methods of teaching be fully felt in the schools. But we are compelled to discard the proposal put forward by many of our correspondents,<sup>2</sup> that all high schools should be encouraged to undertake intermediate work. Many of them already do their existing work so inefficiently that such a change would do more harm than good.

5. It will not be possible, in organising the new system, to follow any single uniform plan. The attempt to secure a logical uniformity of method seems to us to form the main defect of the interesting proposals worked out in a memorandum submitted to us on behalf of a group of reformers, by the Rev. Garfield Williams.<sup>3</sup> The essence of these proposals is that the two top classes of the present high school course should be removed from the high schools

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<sup>1</sup> See below, Section X, paras. 58-61.

<sup>2</sup> See Chapter XII and answers to Question 8 *passim*.

<sup>3</sup> General Memoranda, pages 453-477; see especially pages 466-469.

and combined with the two years of the intermediate course in a new type of institution. We recognise that such a scheme, if it were practicable, would have many advantages; in particular it would secure that the boys would be kept under the same direction long enough to render possible the creation of a real corporate spirit, and the exercise of a strong influence over mind and character. Where such an arrangement is practicable, it might well be adopted, and the regulations governing the intermediate colleges should be so framed as not to preclude it. But as a method to be uniformly adopted it is quite inapplicable to the conditions existing in Bengal. It would imply that all the high schools, except the few which were qualified to undertake the higher work, would be deprived of their two top classes; and that the new institutions which must be provided would have to be designed so as to accommodate far more than twice the numbers now included in the intermediate classes. This would form so serious an addition to the difficulty of an already difficult problem that the adoption of a uniform policy of such a kind would probably make any effective advance impossible.

6. The very important reform which we recommend can, indeed, only be effected if due regard is paid to the conditions already existing in Bengal. An analysis of these conditions shows that there are various ways in which intermediate training of the kind required by our scheme can be provided. All these methods must be simultaneously used, and the conditions existing in each district ought to determine which method will afford the most appropriate mode of meeting its needs.

7. The first method is the addition to a few selected high schools—mainly but not exclusively Government schools—of a higher department dealing with the intermediate work. Where this method is adopted, the top classes in the existing curriculum should be attached to the proposed higher department, and have the advantage of receiving some of their instruction from the teachers engaged in the intermediate work, the lower classes being possibly separately organised. This arrangement would, in particular, facilitate the provision of instruction in elementary science for the two top classes of the present high-school course. But the utmost care must be taken to ensure that no school is permitted to undertake this work unless it possesses, or can be provided with, adequate buildings, staff and equipment. In any case

substantial additional subsidies from public funds will be necessary to enable even the best schools to undertake the new work.

8. The second method is to reorganise and utilise the existing second-grade colleges. Only seven second-grade colleges survive in Bengal. All are closely associated with high schools from which they have sprung; and it would be easy for them, as part of the necessary rearrangement of their organisation, to link the top classes of these schools with the work of the new type. All would need substantial subsidies to enable them to carry on their work according to the plan and method which our scheme contemplates, and which will be more fully described below.

9. The third method is to create at convenient centres new institutions specially designed for this work, and limited to it. Some intermediate colleges of this type will undoubtedly be required. Colleges of this type would, as a rule, provide a greater variety of the special courses described below; and it is likely that they will be most needed in Calcutta, in Dacca, and in close proximity to the more highly developed of the mufassal colleges.

10. At present the great majority of the intermediate students are taught in the first-grade colleges; and it is of the first importance to consider what will be the effect of our scheme upon these colleges, and what is to be done with the students now included in their intermediate classes. These questions will be more fully discussed in later chapters.<sup>1</sup> In our judgment many of these colleges, especially in the mufassal, will in the long run find it most to their advantage, and to that of the community, that they should devote themselves to intermediate work; and we hope that, at the earliest possible date, they will be enabled to make a wise choice between the two alternatives, that of devoting themselves wholly to intermediate work, and that of concentrating all their resources upon degree work. Not until this decision has been reached will the educational system of Bengal be brought into an efficient and orderly condition. At the same time we recognise that there must be a period of transition while the necessary readjustments are being made, and that it must be impracticable to withdraw suddenly all the students in the intermediate stage, even from those colleges which intend to devote themselves wholly to university work. While, therefore,

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<sup>1</sup> See Chapter XXXIV, paras. 121-124 and 141, for the Calcutta colleges, and pter XXXV, para. 46 for the mufassal colleges.

we consider it to be educationally undesirable that higher-secondary (or intermediate) work should be carried on in the same buildings and by the same staff as strictly university work, we recognise that it will be necessary for a time—we hope for no long time—to continue the intermediate work in these colleges alongside of the degree work, until they are ready either to abandon this work or to devote themselves wholly to it. But it is important that, from the earliest possible moment, this part of the work of these colleges should be brought under the control and regulation of the new authority for higher secondary education, and that they should be required to fulfil the conditions laid down for intermediate colleges in regard to size of classes, etc. To enable them to do this, it will be necessary to give them financial aid.

11. It is, of course, essential for a discussion of the scheme that we should form a trustworthy estimate of the cost, both initial and recurring, of working the numerous intermediate colleges whose institution we advocate. This will depend in part upon the extent to which it will be possible to utilise existing institutions, a point upon which we have no means of judging. But it must depend in an even greater degree upon the character of the instruction to be given; and it is, accordingly, to that theme that we must next turn.

## II.

12. The intermediate college must be regarded as fulfilling a double purpose. In the first place, it must provide a training such as will qualify its students for admission to the University, in all its faculties, or into other institutions for higher or technological training. In the second place, it must provide a training suitable for students who, after completing their course, will proceed direct into various practical occupations. As the system develops we should expect to find an increasing number of students entering upon the intermediate course solely with a view to preparing themselves for various practical careers.

13. These two categories, however, though their needs must be kept in mind, ought not to be too sharply differentiated from one another. The boy who has just completed the general high school course and passed the high school examination cannot fairly be required to have made up his mind whether he will proceed to a university course or not. He does not yet clearly know what possibilities are open to him; and, in Bengal beyond all other countries,

the tradition that a university career is the right and natural one for all boys of ability and ambition is too deeply rooted to make it reasonable to expect that a boy will choose a course of study which will definitely exclude him from the University. The experience of the 'B' and 'C' courses in the high schools<sup>1</sup> is generally regarded as showing that carefully devised schemes of study are likely to fail unless they give access to a university career. While, therefore, the courses of the intermediate colleges ought to be so differentiated as to meet the needs of students of many different types, they ought not to be sharply differentiated into university and non-university courses. So far as may be, every alternative course of study should represent a possible line of approach to university work; and the examination should be so designed that the university will accept it (under certain defined conditions) as admitting the successful candidate to its courses in one or another faculty.

14. This is the less impracticable because, whatever career the student is ultimately to follow, one of the primary functions of the intermediate college must be to give him, so far as the limits of time permit, a sound liberal education, such as he cannot now get from most of the high schools, and will not be able to get, however rapidly the reform of the high schools may proceed, for many years to come. It will be a training specialised in some degree in view of his future career, as even the present intermediate course is, despite its defects. But it must also be a liberal training, and the 'vocational' element in it must be subordinate to this. If the intermediate course is thus conceived, it ought to be natural for the University to accept any form of it; for even though some forms of it may be materially influenced by the needs of particular professions, a modern university is a great nest of professional schools; and so long as the preliminary training for a professional career is not too narrowly technical, but uses the subjects of professional interest as the means of a liberal education, an enlightened and modern university should readily accept it, if it is satisfied that the course, and the examination which concludes it, meet the needs of its own schemes of training.

15. We recommend, therefore, that the courses in the intermediate colleges should be so designed as in every case to give admission

<sup>1</sup> See Chapter VIII, para. 48.

(if the examination at the end of the course is successfully passed) to the University, though not necessarily to every Faculty of the University. Thus one group of subjects would be specially suitable for admission to the Faculty of Arts, another to the Faculty of Science, another to the Faculty of Medicine, another to the Faculty of Engineering, another to the Faculty of Commerce or of Agriculture. At the same time we should regret any undue rigidity in the qualifications required for admission to various Faculties.<sup>1</sup>

16. At present the intermediate course is differentiated into two distinct branches, arts and science; but, as we have seen, the distinction between them is in some cases very slight indeed. Since we contemplate provision for a great variety of different groupings of subjects, none of which will be either purely arts or purely science, we suggest that this distinction should be abandoned; and that a single examination, with a single name, but with a considerable variety of forms, should end the course.<sup>2</sup>

17. One of the most fundamental distinctions between the intermediate college and the present intermediate classes must be that the intermediate college will use the methods of a good school, in classes of reasonable size wherein question and answer will be possible rather than the methods of the mass-lecture. The maximum size for a school class at the top of the high school is fixed by university regulations at 50. This is too large for the greater part of the teaching work of a well-organised school; in especial a single teacher cannot supervise practical linguistic drill or practical science in a class of anything like this size.<sup>3</sup> On the other hand, there are parts of subjects in which a class of this size, or even larger, can be quite efficiently handled. We recommend that variation in the size of classes should be provided for, and that small classes of 30 or less should be insisted on in all parts of the teaching in which it is essential that each pupil should daily receive individual attention. In

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<sup>1</sup> Thus students who had taken at the intermediate stage a course not normally recognised as admitting to the Faculty they desired to enter should be afforded facilities for taking subsequently any necessary subjects they might have omitted.

<sup>2</sup> It is worth noting that the distinction between the intermediate in arts and the intermediate in science is not drawn in some other universities, for example in Allahabad; and the abandonment of the distinction in the case of Calcutta has been already recommended by the Committee of sixteen.

<sup>3</sup> Even the existing regulations of the University for practical work in intermediate classes prescribe a maximum of 20.

some parts of several subjects these smaller classes might be grouped together. The question of the size and grouping of classes is important, because it must necessarily affect deeply the cost of staffing these colleges. There is one great difference in regard to staff between the intermediate college and the high school. The high school teacher need not be, and in some ways ought not to be, purely a specialist; in the intermediate colleges some, at any rate, of the teachers must necessarily be specialists. And this, again, must increase the cost of adequately staffing these colleges. But any detailed analysis of the teaching staff which will be required must depend upon the plan of the curriculum.

### III.

18. Since a primary aim of the course in the intermediate college is to give the student a liberal education, there must be a common element in all forms which this course may assume. And the most essential part of this common element must obviously be a training in the media of self-expression, and of exact and clear thinking. This is, of course, the primary purpose of linguistic training; and the educated Bengali boy, who has to be bilingual, must be given a sound training in the use of at least two languages—his mother tongue and English.

19. But the teaching in languages, and especially in English, must be far more practical than it has hitherto been. It must not consist in learning by heart minute commentaries on prescribed selections from the classical English literature. The student must learn to read modern English easily; and therefore, while he may rightly study with care a few selected books chosen for the purity and directness of their style, he must also be expected to read somewhat widely. Next, he must be able to write English with clarity and precision; and therefore he must have constant practice in making précis, and in composing essays, and he must receive constant and competent criticism of the work which he does. Finally he must be able to speak English easily and correctly; and therefore he must be practised in reading aloud, and in speaking; and since the spoken use of a foreign tongue is difficult, it is desirable that he should be trained with the help of phonetic methods. All this involves teaching in relatively small classes. It involves, also, the employment of teachers who have not only an easy mastery of the language, but a knowledge of modern

linguistic methods. Manifestly it would be to the advantage of the students that the teaching should be, as far as possible, in the hands of English teachers. It is partly in view of this need that we have been led to make the recommendations regarding the enlistment of a special corps of teachers which will be found in the last chapter.

20. The provision of adequate teaching in English, on such a plan as we have outlined, would demand a considerable expenditure of time. The authorities of Serampore College, who speak from an intimate knowledge both of school and college work, suggest, in the very full and interesting memorandum<sup>1</sup> which they have submitted on the organisation of this sort of work, that eleven periods a week—that is, one period on Saturday and two on every other day—would be necessary for the purpose. We are inclined to think that this is unduly high; and that, provided the classes are small and the teaching efficient, eight periods in the first year and six in the second might very well suffice to ensure that the student possessed a real mastery of the language. Certainly his knowledge would be incomparably more efficient than it now is at the end of the intermediate stage; and his equipment, whether for university courses or for an immediate entry into practical life, would be proportionately better.

21. We attach great importance to the systematic study of the vernacular at this stage,<sup>2</sup> not only for its own sake, but as a means to clear thinking. The student should read some of the best work in modern Bengali or other vernacular, and be given practice both in composition and in clear and correct speech. Three periods a week, under competent teachers, would be sufficient for this purpose.

22. The only other subject which would seem to have a claim to be made generally compulsory in the intermediate stage is mathematics. But the only valid reason for such a claim is that the minimum standard of mathematical work required in the matriculation examination is insufficient for the purposes of a general education. We agree that this is at present the case. But we see no reason why it should continue to be so. Many of the schools have already shown that they can reach a much higher standard; this is demonstrated by the facts that about half of

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<sup>1</sup> General Memoranda, page 333.

<sup>2</sup> Chapter XVII.

the candidates in the matriculation examination take additional mathematics, and that the average mark of all candidates in 1917 was no less than 61·2 per cent. It therefore seems practicable, even before any general improvement of the high schools has been effected, to raise the minimum standard demanded for admission to intermediate courses. We recommend that this should be done ; and that, consequently, mathematics should not be a compulsory subject for all students in the intermediate stage, though it would of course form a necessary element in many of the alternative courses which we shall propose.

23. English and vernacular would thus be the only universally compulsory subjects for all students in the intermediate colleges. We have next to consider how the remainder of the course of study should be planned, (a) for students who propose to proceed to the ordinary university courses in arts and science, and (b) for students who wish to qualify themselves for various professional careers. It is obviously impossible for us to define with exactitude the elements in the curriculum for all these purposes.<sup>1</sup> That must be the duty of the Board of Secondary and Intermediate Education when constituted, acting with the advice of the universities ; but we hope that the Board will allow to each college a considerable latitude in the arrangement of its curriculum and of its time-table. It will be enough for our immediate purpose if we indicate in general terms the range of subjects which it would be desirable to include for various purposes.

24. Taking first the needs of students preparing themselves for degree courses in arts, we would urge the importance of securing that before entrance to the University they should have obtained some insight into the methods of natural science. We have already recommended that an element of natural science should be included in the high school course. But we recognise that in view of the difficulty of obtaining a sufficient supply of well-qualified teachers in this subject, it will be but slowly that this recommendation can be given practical effect. Until, in the judgment of the Board, the introduction of science into the high school course has been effectively carried out we think that all arts students in the intermediate stage should receive an introduction to science, during at least one year ; though the course in this subject need not

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<sup>1</sup> For tentative suggestions as to courses of study in the intermediate colleges see the volume of appendices to this report.

be uniform in all colleges, and need not be included in a centrally organised examination. When science teaching has become general and efficient in the high schools, it need no longer be made compulsory for arts students in the intermediate stage.

25. The course of a student who is looking forward to an arts degree ought also to include, if it be at all possible, some knowledge of history, an introduction to systematic geography, a course in English literature and literary criticism (as distinct from the practical study of the language, which will be common to all students), and a discipline in at least one of the 'reasoning' subjects—logic, economics or mathematics. To include all these subjects in a single course would obviously be impracticable; but the opportunity of studying each of them should be open to every student of this type.

26. But we have as yet left out of our reckoning another subject of very great importance—the study of oriental classical languages. Under the existing system every student is required to have presented a classical language in the matriculation examination. We have already recommended<sup>1</sup> that this requirement should no longer be enforced upon all students taking the high school examination, which will in our scheme take the place of the present matriculation. The question therefore arises whether the requirement of a classical course should be transferred from the high school to the intermediate stage. This is a question upon which the determining voice must necessarily rest with the universities, when they decide upon what conditions they will admit students to their courses. If the universities require every student to have taken a classical language as a condition of admission to degree courses in arts, then, manifestly, a classical course must be a necessary element in the intermediate stage for all students aiming at degrees in arts. On the other hand, the University may decide that this requirement can be dispensed with, or need only be exacted from those students who intend to follow courses of particular types. The only way of providing against all possibilities is to include the classical languages among a list of subjects from which a choice should be made. We think it would be practicable to demand from the student at this stage four subjects in addition to those already defined. And we recommend that these four subjects

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<sup>1</sup> Chapter XXXI.

should be chosen from a list including (1) a classical language ; (2) history ; (3) geography ; (4) English literature ; (5) logic ; (6) economics ; (7) mathematics. Not all these alternatives need, of course, be offered in all intermediate colleges ; and if the University should insist upon a classical language in all cases, the range of free choice would be in fact restricted to three subjects. But greater freedom might be regained, if or when natural science ceased to be compulsory for arts students at the intermediate stage.

27. Our attention has been directed by many witnesses and correspondents to the heavy burden under which Bengali-speaking Musalman students now labour, owing to the large number of languages they are compelled to study, because of the requirements of the universities on the one hand, and the religious and social demands of their community on the other.<sup>1</sup> In view of these difficulties, and on the recommendation of many leading Musalmans, we are prepared to advise that if an oriental classical language (Sanskrit, Pali, Arabic or Persian) is prescribed, either as a compulsory or as an optional subject, Muslim students who do not present Urdu as their vernacular should be permitted to take this language in lieu of one of those named.<sup>2</sup>

28. But in whatever way the problem of the classical language is dealt with, we recognise that the course which we have defined is wide in its range. It would be an impossible course if it were to be conducted by the present methods of mass-lectures. Yet, as things now are, all the elements in it seem to us to be indispensable. And we believe that all can be dealt with on a well-organised system of class-teaching ; especially as all the elements in the course need not be, and ought not to be, treated as equal in weight, and some of them might perhaps be taken only in a single year. If we allow for twenty-eight periods in the week, there will, in fact, be room for an adequate treatment of the whole group of studies defined. But the course is undoubtedly wider in its range than is ideally desirable at this stage in a student's development ; and we hope that, as the high schools improve, it will become possible to reduce the range, and therefore to increase the depth, of the intermediate course.

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<sup>1</sup> See Chapter VI ; see also Chapter XLI, para 25. *ad fin.*

<sup>2</sup> Chapter XLI, para. 25.

29. The student who intends to proceed to a science course in the University ought to take at least two science subjects—mathematics and a full treatment of geography should also be included among the list from which he might select. It would be well that he should, for cultural purposes, take also a course during at least one year in literature, history or economics, without having to undergo examination in it. In view of the necessity of his spending a considerable amount of time in the laboratories, the weight of his course would be at least equivalent to that which we have suggested for the arts student. It would also give him a solid basis of general knowledge.

#### IV.

30. We have next to consider the needs of students who may desire to proceed to professional training, and for that purpose to enter one of the professional colleges, which prepare candidates for professional degrees of the university, or other professional qualifications in medicine or engineering or, in the future, in agriculture; the needs of courses in scientific technology would probably be fully met by the kind of course we have suggested for science students.

31. The needs and requirements of the professional courses in medicine are dealt with elsewhere.<sup>1</sup> But it is plain that a student who had taken the intermediate course on such lines as we have suggested for the science group would be far better qualified to enter upon a medical training than most students now are, specially because he would have a more adequate knowledge of English. We do not, however, believe that it would be possible to provide, in all the intermediate colleges, or in any large number of them, the full equipment necessary to cover the whole range of the preliminary scientific examination of the medical degree course; nor do we think that, in view of the present condition of secondary education in Bengal, the whole of this range could be covered, by more than a few exceptional students, alongside of the necessary elements in the intermediate course, within the two years which we have assigned for the intermediate curriculum. We think, however, that an attempt should be made, as an experiment, to provide the necessary teaching at a few colleges, one or two in Calcutta, one at Dacca, one in Western Bengal, perhaps at Bankura, and

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<sup>1</sup> See Chapters XXIII and XLIV.

one in Northern Bengal, possibly at Rangpur or Rajshahi. Some students in these colleges might be able to cover the whole of the work in two years; others, after taking the intermediate examination at the end of the two years' course, might then proceed to the preliminary scientific examination at the end of a third year. But it would obviously be impossible to limit the entries to the medical colleges to those students who had attended those intermediate colleges which provided teaching in all the subjects required. Students who had taken the intermediate course in other colleges would therefore have to be otherwise provided for, either by admission to a third year's course in these special colleges, or by special arrangements made in the universities to which the medical colleges were attached, for the provision of special instruction either in their own or in college laboratories.

32. One material advantage which would result from the organisation of a few intermediate colleges to provide for the special needs of medical students would be that the medical schools, (as distinct from the medical colleges) whose students are prepared not for a degree, but for the licentiatehip, granted by the State Medical Faculty of Bengal, would be provided with better-trained entrants, and saved from the necessity of providing training in the preliminary scientific studies; a necessity which places difficulties in the way of the much-needed expansion of medical training of this type. In any case it is obvious that one of the alternative courses of study offered in the intermediate colleges should be, so far as possible, adapted to the needs of intending medical students. In the drafting of this course the Board should take the advice of medical men; and the medical colleges and schools might reasonably make such special allowance as seemed possible for students who took this course. We hesitate to put forward very precise recommendations on this subject, which should be dealt with by the Board, in consultation with the medical authorities, and with reference to the general development of secondary and higher secondary education. But we feel that the organisation of the intermediate colleges, once it is established, ought to be utilised to the fullest possible extent for the purpose of affording an adequate preliminary training for medical men.

33. It is obvious that a special group of courses should be designed for students intending to undertake the career of engineering either directly, or after a course at Sibpur or other institution

for training in engineering.<sup>1</sup> This course should include mathematics at a high standard, with chemistry, physics and mechanical drawing. Such a course would, we believe, not only prepare the student to take advantage of the regular course of study in engineering, it would be welcomed by the railway companies and other great engineering firms, many of which would probably be prepared to take students thus trained directly into their employment, or into a period of apprentice-training.

## V.

34. In another chapter<sup>2</sup> we have shown that while Bengal has need of a certain number of highly trained agricultural experts, the number of such men who can find adequate employment is likely for many years, and perhaps always, to be small. But the educational system ought to be able to render services on a far larger, though less ambitious, scale than would ever be possible through the production of highly trained graduates. We believe there is need for men with a much less complete and scientific training than that which ought to be represented by a degree course. Zamindars who wish to understand the management of their own estates, and the agents who work for them, and the administrative officers of rural co-operative societies or district boards, and, perhaps, some of the teachers in rural schools, need a kind of training far less elaborate than a full degree course, such as is outlined in Chapter XLVII; and the kind of training which they need might very well be provided for them in some of the intermediate colleges in rural districts, especially in the neighbourhood of experimental and demonstration farms.

35. A course suitable for these purposes might include chemistry, botany, land-surveying, an introduction to the principles of agriculture sufficient to enable the student to follow with intelligence the work of the research stations and the experimental farms; and alongside of these some training in book-keeping. Mr. Coyajee has pointed out<sup>3</sup> that such a course would practically correspond to the 'short course' in agriculture given at the University College of North Wales. A man thus equipped would be of

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<sup>1</sup> Chapter XLVI.

<sup>2</sup> Chapter XXV; see also Chapter XLVII.

<sup>3</sup> General Memoranda, page 366.

great use to a zamindar or a co-operative society; and an intermediate course planned on these lines might very properly be accepted by the University as a qualification for admission either to its courses in agriculture, or to its ordinary scientific course; so that the student who had taken it, while prepared to undertake certain kinds of agricultural work, or to pass into an agricultural college, would not be excluded from university courses. Here, again, we hesitate to lay down very definite recommendations; but we feel convinced that the intermediate colleges can be made of genuine service to the agricultural development of Bengal.

## VI.

36. A large proportion of the teachers in the high schools of Bengal enter the teaching profession immediately after passing (or, in many cases, failing at) the intermediate examination. Under existing conditions these students, during their undergraduate course, receive no kind of direct preparation for this career; there is no means of ensuring that they have studied the subjects they will have to teach; and in nine cases out of ten their only experience of the nature and aims of school work is that which they have derived from their own attendance at inefficient schools.

37. It is of vital importance that teachers of this class should receive a better training than they have hitherto received, and we believe that it will be within the power of the intermediate colleges to afford such a training. In the first place it is obvious that the more thorough and practical knowledge of English which the students will obtain in these colleges will be of the highest value to them, especially if they receive some training in phonetic methods; while the more careful cultivation of the vernacular which should be a feature of the new intermediate colleges will be very helpful. The course, as a whole, will be specially useful for this purpose, because it can readily be made to include all the principal subjects in the school curriculum. To this we would add an introduction, not too pretentious in character, to the art of education; it would count as an alternative to logic and economics. This might involve at most one or two lessons a week, illustrated by occasional visits to the best available high schools in the neighbourhood and by a certain amount of practical work. The course need not include, except incidentally, psychology, or any formal study of the history of education; enough if it analyses and

discusses the aims of school work, and the methods by which they can best be pursued. And the student will learn much (if the intermediate college which he attends is organised, as it ought to be, as a thoroughly efficient school) from merely watching the methods of his own teachers.

38. Training of this kind would not, and ought not to, take the place of the serious and systematic training which will be given in the university department of education<sup>1</sup>, or in a good training college. But at least it would mean that all that very numerous class of teachers who are unable to go beyond the intermediate stage will be much better equipped for their work than they now are. And in recognition of this we recommend that a definitely higher rate of salary should be offered to teachers who have taken a course of this kind.

39. It is obvious that such a course as we have described would be entirely suitable to admit students to the arts courses of the Universities, since it would cover practically the same ground as is required for ordinary candidates for admission to the Faculty of Arts. The student could take it, therefore, with the knowledge that while he was equipping himself in some degree for the profession of teaching, he was also qualifying himself for admission to a university. We should hope that many students, after taking a course of this kind, might teach for a year or two in a school, and then proceed to the University, either to take an ordinary arts degree (which might or might not include education as one of its subjects) or to pursue a course of study under the university department of education, leading normally, after a year's course, to the licence in teaching (L.T.) or in some cases, after a special course of three years, to the degree of B.T.<sup>1</sup> We believe there is room for a course of this kind, which should include, besides an adequate study of professional subjects, some further study of those general subjects which are most widely studied in schools. A course of this kind would be of the highest value, and would not involve any lowering of the standard of the B.T. degree. Should this kind of course come to be widely followed, we should recommend that the utmost liberality should be shown in facilitating the transfer of qualified students who had reached the intermediate stage from

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<sup>1</sup> See Chapter XLIII.

teaching work in the university department of education, and for rewarding them by increased pay when this course was completed.

40. In our judgment courses of the kind we have described should be provided in most, if not in all, intermediate colleges. The chief difficulty would be found in providing teachers capable of affording adequate guidance in the subject of education, while at the same time taking a share (as it would be necessary that they should) in the ordinary work of the college. This constitutes a further argument in favour of the importation of a number of western-trained teachers who, besides doing this work, could help in the English teaching. We should anticipate that some colleges would specialise in this kind of work; whose value and importance can scarcely be exaggerated. The colleges at Hooghly; Krishnagar, and Bankura, for example, struck those of us who visited them as especially well fitted to undertake this kind of work, more particularly because they happen to have some schools of more than average quality in their vicinity.

41. We attach great importance to the service which the intermediate colleges can render in this way. The educational progress of Bengal depends absolutely upon the possibility of increasing the number of efficient teachers in the schools; and while the intermediate colleges obviously cannot give a complete and systematic training, such as will be afforded in the University and in special institutions, they can give a useful introduction to the teacher's calling, and an equipment more satisfactory than the majority of teachers now possess. The needs of Bengal demand that every possible mode of improving the equipment of teachers should be used.

## VII.

42. A very large number of our correspondents<sup>1</sup> have urged the importance of providing a system of training suitable as a preparation for commercial life. Many of them hold that this need will be adequately met by the provision of a university degree course in commercial subjects.<sup>2</sup> We do not wish to question the value of such a course. But it can be suitable only for the few, who are willing to postpone the commencement of a business career until

<sup>1</sup> See Answers to Question 6, *passim*.

<sup>2</sup> See Chapters XXVI and XLVIII.

they reach the age of 21 or 22, an age at which few business firms are willing to accept recruits. It is the experience of those British universities which have initiated such courses that there are never more than a handful of students willing to take them up in substitution for the more usual degree courses, and that the great majority of the degree students in commerce consist of men actually engaged in business, who attend lectures in the evening.

43. Without disparaging university courses in commerce, it may fairly be said that what Bengal most needs is training at an earlier age, such as will interest the youth in commercial work, and fit him for undertaking it at the age at which recruits are generally sought by business firms. The need for such earlier training is strongly emphasised in a memorial addressed to us by the Marwari Community of Calcutta,<sup>1</sup> whose judgment on such a subject is obviously of the first importance. "The community believes from its own experience," we are told, "that an early saturation of its youth in business methods is eminently desirable." They therefore urge that the matriculation courses should be so shaped as to render possible the study of a group of subjects such as would provide some introduction to commercial practice.

44. We readily admit the desirability of introducing an element of this kind into the curriculum of those high schools which are capable of providing it. But we believe that more than this is necessary. The majority of the high schools of Bengal are not likely to be able to provide instruction of this character for a long time to come; and it is rather in a subsequent stage that most Bengali boys will be able to begin to work on these lines. The age 17-18, at which the intermediate course will end, is not too late to enter business-life; and we believe that the intermediate colleges might with advantage provide a course suitable for such boys, while at the same time generous in its range, and suitable as a preparation for university work.

45. What a business man in Bengal most wants in the young recruit to his office is, in the first place, an accurate knowledge of English—not a memory-knowledge of notes on *Sesame and Lilies*, but a practical command of the language as it is spoken and written to-day; this the intermediate course, as we have planned it, will give more thoroughly than it has ever hitherto been given. If

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<sup>1</sup> General Memoranda, page 16:

it be thought desirable to give some special training in commercial correspondence,<sup>1</sup> a weekly lesson during the second year would easily provide it. Next he wants good arithmetic; and if the applicant has also a mastery of other branches of mathematics, so much the better. He wants also a good working knowledge of geography, in which Bengali boys are as a rule very deficient, and, if possible some science. If the candidate can write shorthand and use the type-writer, that will give him a great advantage; and if he has been initiated into the mysteries of book-keeping and accountancy, he will be the more welcome. But what the business man especially wants in his employé, and what will more than anything else help him to get on, is intelligence, alertness, honesty, and capacity to work easily with other people, and to understand orders clearly and express himself accurately and precisely—the sort of qualities cultivated in a good school, which places a proper value upon corporate life, and does not limit itself to preparing candidates for examination.

46. It is obvious that the intermediate college ought to be able to provide a course which would fully meet all these needs, and at the same time be a suitable preparation for a university career. What is needed is, in truth, neither more nor less than a good general education with a modern and practical bias. The course ought to include a sound training in commercial geography, and some introduction to economics—especially elementary descriptive economics, which implies some understanding of the processes of trade. It ought to include sound mathematics, especially higher arithmetic; and some training in book-keeping and accountancy, which is by no means a purely mechanical or unintelligent subject, might find a place in the course. With these would go modern history; and if the student should add Sanskrit (which the Marwari community recommend as an element in a commercial course) he will be the better prepared for university work, should he ultimately decide to enter upon a university course.

47. With an equipment such as is here outlined, the student would be a useful recruit in any business office. He would be equally well-equipped to take his place in the clerical services of various departments of Government, such as the Post Office.<sup>2</sup>

<sup>1</sup> Desired by the Marwari Community, General Memoranda, page 16.

<sup>2</sup> See Chapter XXVIII.

We believe that such a training as has been outlined would in fact form the best preparation for all but the higher and more specialised posts in Government service ; and we shall recommend, in another part of this report<sup>1</sup> that the intermediate examination should henceforth be recognised as the required qualification for all but a few of the higher Government posts. We do not mean that holders of degrees should be excluded from consideration. But we regard it as unfortunate that many hundreds of students should be drawn on, as they now are, to follow degree courses for which they are ill-fitted, merely because the possession of a degree is supposed to give them an advantage in applying for even minor Government posts.<sup>2</sup>

### VIII.

48. In the foregoing paragraphs we have expressly avoided any attempt to specify with exactitude the content of the various alternative courses or groups of subjects which ought, in our judgment, to be provided for in the intermediate colleges. That must be the business of the Secondary and Intermediate Board, when it is established, and of its advisory committees ; and it may be assumed that the various alternatives will have to be modified from time to time, in accordance with changing needs, and in order to correspond with changes and improvements in the high schools. The aim of what we have written has been to illustrate the multiform ways in which the intermediate colleges may be made to meet a variety of needs neglected by the existing system, and to show how a vocational colour or bias can be given to their courses without in any way diminishing their value as sound and liberal training or making them unsuitable as preparation for university courses.

49. It is, however, essential that all the alternative courses should be approximately equivalent in the demand which they will make upon the ability of the student. From this point of view it must be impossible to treat each subject as an equal unit ; to balance shorthand and typewriting, for example, against mathematics. This seems to us to be the main defect in the otherwise excellent scheme set forth by Mr J. C. Coyajee,<sup>3</sup> to which we would

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<sup>1</sup> See Chapter L.

<sup>2</sup> See Chapter XXVIII.

<sup>3</sup> General Memoranda, page 366.

direct the attention of those who desire to see a project, very similar to that which we put forward, more fully wrought out.

50. It seems necessary to guard against the suggestion that every alternative course, or even the majority of the alternatives, should be offered in all the intermediate colleges. We should desire to see the colleges specialising to some extent; and while, in our judgment, almost every intermediate college ought, if possible, to provide a course for teachers, as well as the ordinary courses preparatory for the University, it would be natural that courses of the agricultural type should be provided only in a few colleges near experimental farms, and that commercial courses should be provided mainly in town centres.

51. In regard to the examination which must necessarily be provided at the end of the course, we have already shown<sup>1</sup> that it is possible to introduce in the intermediate colleges, because of their better organisation and their smaller numbers, improvements in the system of examination which should materially reduce the pressure upon the candidates, and enable them to concentrate their attention upon their subjects of study, instead of living in constant dread of the examination, and thinking of their work only as a preparation for it. We should deprecate the imposition upon the students of too heavy a burden of examinations, and we think that there should be some subjects of study in which no centralised examination should be imposed. This subject will be more fully discussed in a later chapter,<sup>2</sup> and need not be developed here.

### {IX.

52. In the intermediate college, as in the school and the university, the formal discipline of the class-room is but a part of the training which the student receives. Whether his needs in other respects are considered and provided for, or not, his bodily health is affected either for good or ill, his moral outlook is influenced, in one direction or another, his capacity for comradeship, loyalty and public spirit is strengthened or weakened, by the conditions under which he has to work during these critical and formative years of his life. It is neither wise nor safe to leave these things

<sup>1</sup> Chapter XXXI.

<sup>2</sup> Chapter XL.

to chance, as, for the most part, they have hitherto been left both in the schools and in the colleges of Bengal.<sup>1</sup>

.53. We therefore attach the greatest importance to the proper supervision and organisation of the physical well-being of the students, and to the cultivation of every possible means of strengthening corporate loyalty and discipline among them. We regard it as essential that every intermediate college should be provided, wherever possible, with adequate playgrounds; that there should not only be opportunities for games, but regular physical training; and that the students should have access to good medical advice.

.54. Not less important is the provision of simple but healthy residential accommodation. In connexion with intermediate colleges in Calcutta the provision of hostels ought not, indeed, to be necessary on any large scale, because the Calcutta colleges (apart, perhaps, from those which devote themselves specially to commercial courses) ought to cater mainly for Calcutta boys, and we should regard it as a sign that the scheme was ill carried out if, once it is properly set going, any large number of mufassal boys who have not near relatives in Calcutta come into Calcutta for intermediate training. But at the mufassal centres, which will generally be at the administrative headquarters of the districts, it may be anticipated that a very large proportion of the students—in many cases the majority—will come from the villages of the district, and will require accommodation. This should be as cheap and as simple as possible, because, in mufassal areas, the importance of getting the maximum accommodation on to a given site is not, or need not be, so urgent as it is in Calcutta, if the sites are wisely selected; and simple hostels of the bungalow type, such as we saw at Gauhati or (in a still simpler form) at Daulatpur, become practicable. We urge that the provision of adequate hostel accommodation, and of proper hostel supervision by a staff of carefully selected superintendents, should be regarded as one of the first necessities when any new intermediate college is established.

.55. All these requirements necessarily add to the cost of establishing and maintaining an intermediate college: since provision must be made for ample space, for residential buildings, for the salaries or allowances of hostel superintendents and of a well qualified physical director or instructor. But if the youth of Bengal is

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<sup>1</sup> See Chapter XIX.

to be given a fair chance, all these things are necessary. Nor is it possible to charge high fees. We consider that the average fee rate ought not to exceed Rs. 5 per mensem; though in some colleges, and for some special courses, a somewhat higher rate might reasonably be charged. We assume, also, in the following very rough estimates that about 10 per cent. of the students will probably be admitted without fee, and another 10 per cent. on half fees.

## X.

56. We have made no attempt to estimate the cost of providing the necessary buildings for the establishment of an intermediate college: not only must the cost of sites vary from place to place, but it is obviously impossible to anticipate in how many cases, and to what extent, the necessary provision might be reduced by the utilisation of existing buildings in cases where the intermediate classes were either attached to an existing school, or where an existing college was devoted to this purpose. The Serampore College staff, which has furnished us with a very full and careful memorandum on the subject,<sup>1</sup> estimates the cost of land and buildings for a new collegiate school of 600 boys at over 8 lakhs, including some hostel accommodation; but the cost of land in Serampore is specially great because the college has a river frontage; and in most cases a much smaller amount would probably be sufficient.

57. Such an estimate, wrought out in some detail, will be found in an appendix; a summary of its main features will also be given in Chapter LII. The Serampore College staff<sup>2</sup> have also supplied us with an independent estimate. Our estimate is based upon the assumptions that in each intermediate college there will be a well paid head master, one or two western trained teachers with good salaries, and a staff on good rates of pay, sufficiently numerous to cover a fairly wide range of subjects and to make work in small classes possible. It provides, further, for working and administrative expenses, for a competent director of physical training in each college, and for the provision of allowances for hostel superintendents.

58. The result of these calculations, on the basis on which we have made them, is that each intermediate college would involve

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<sup>1</sup> General Memoranda, page 333.

<sup>2</sup> *Ibid.*, page 335

the State (or private supporters) in a net annual outlay of about Rs. 50,000 or more for every college, after deducting fees ; so that if, as might ultimately be the case, there were to be some forty intermediate colleges, the annual cost, apart from the initial charges of land, buildings and equipment, might be about twenty lakhs. We regard this as a reasonable expenditure, in view of the great value of the services which these institutions will be able to render to the community.

59. But there is another way of looking at the matter. Should a wealthy man desire to enrich permanently the intellectual resources of his native district, and to be remembered for ever as a patron of learning and the friend of aspiring youth, we imagine that he could do nothing better than to establish and endow an intermediate college, with hostels and playing fields, a library and laboratories. He could build it on a handsome scale, and endow it permanently so that it would be self-supporting, for twenty lakhs. That is a very large sum, which few of the rich men of Bengal could individually provide. But it is small in comparison with the continuous and ever growing return of human happiness, intellectual enlightenment and public advantage which it would yield.

60. We regard the creation of well-organised intermediate colleges in all parts of Bengal—united, in some cases, with the upper classes of high schools, and in others serving as the crown of all the high schools of their districts—as the most immediately valuable reform which can be undertaken in the educational sphere. To bring all the high schools up to a reasonable pitch of efficiency will take a generation, because the teachers have yet to be trained, and the funds that will be needed will be very large indeed. The provision of intermediate colleges is a relatively simple matter ; to provide a sufficient number of reasonably good teachers for (say) thirty institutions is not impossible. And the creation of these institutions—provided that they are adequately equipped—will at once influence for good all the high schools and other secondary schools. It will supply many of the industries of Bengal with the trained recruits whom they need. It will do more than anything else to solve the university problem, by withdrawing for a more appropriate kind of training the immense number of ill prepared boys who now fill the university class-rooms, and by sending up to the universities a stream of students really capable of profiting by their instruction. It will go far to solve the complex and difficult

problems, moral and social, which have been created by the drift of thousands of boys into the dangerous conditions of city life, where they are unguided and uncontrolled.

61. But the advantages which we anticipate from this reform will be lost if it is not seriously carried out on an adequate scale. If an attempt is made to organise these colleges—as most of the high schools and most of the colleges have in the past been organised—on a cheap basis, and to be satisfied with the creation simply of a new coaching organisation for a new set of examinations, the change which we propose will do no good; it may even do harm. From the outset the standard must be kept high. It will be no kindness to the youth of Bengal, but very much the reverse, to create cheap and bad institutions on the plea that the money for adequate organisations is not forthcoming; for the influence of the bad will degrade the better, and there will be a return to the vicious circle in which Bengal now finds herself, and from which escape is so difficult. To Government and people alike we appeal, if they adopt these proposals, to adopt them with the serious resolution that this new educational grade shall not be permitted to be ruined.

## CHAPTER XXXIII.<sup>1</sup>

### THE UNIVERSITY OF DACCA.

#### *I.—The existing schemes for establishing a university at Dacca.*

1. The scheme for the creation of a university of Dacca started in 1912 has had infinite pains spent on it, and the various and complex plans elaborated for the legal and material constitution of the University have been referred to us for consideration and report.

Two main factors may be clearly distinguished in the origination of the scheme : first and foremost, the desire of the Musalmans of Eastern Bengal to stimulate the educational progress of their community, and secondly, the desire of the Government of India to create a new type of residential and teaching university in India, as opposed to the present affiliating type. To these must be added a third factor of especial importance, the desire of the Government to relieve the congestion of the University of Calcutta.

To arrive at any clear understanding of the present position in regard to the Dacca scheme, with the multiplicity of reports which have accumulated under changing conditions, arising in part from public and official criticisms of the original proposals, in part from the financial stringency produced by the war, a brief historical survey is necessary. But we shall limit that survey to those statements, both in regard to principles of constitution and to educational features of the schemes proposed, which seem to us of major importance.

It is to be remembered throughout that Dacca College, a Government college, is the most important and best equipped in the mufassal; that there is in Dacca another 'first-grade' college aided by Government and affiliated to the University of Calcutta, the Jagannath College; that Dacca, a town of about 110,000 inhabi-

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<sup>1</sup> For the sake of brevity we shall in this chapter refer to the Report of the Dacca University Committee (Bengal Secretariat Book Depôt, Calcutta, 1912) as the 'Dacca Report.' The references to evidence are all taken from the replies to Question 4 of our questionnaire, except where otherwise indicated.

tants, was the capital and administrative centre of the province of Eastern Bengal and Assam from 1905 until the territorial readjustment of 1st April 1912; that the population of that province was predominantly Muslim; that the education of the Musalmans in that province, though it had made progress during the period just defined, was in a backward condition at its close, and is so still at the present time.

2. In an address presented to the Viceroy (Lord Hardinge) at Dacca on 31st January, 1912, a number of Muslim representatives of Eastern Bengal and Assam placed certain proposals before him with the object of safeguarding the interests of the Muslim community. They pointed out that the Musalmans had not taken advantage of Government educational institutions to any extent comparable with the Hindus, and they expressed their doubts whether the modification of the partition of Bengal might not retard the educational progress of their community. In his reply, Lord Hardinge said that the Government of India realised that education was the true salvation of the Muhammadans and that the Government of India, as an earnest of their intentions, would recommend to the Secretary of State the constitution of a university at Dacca. On the 2nd February, 1912, a communiqué was published stating the decision of the Government of India to recommend the constitution of a university at Dacca.

3. On 16th February, 1912, a deputation headed by Dr. (now Sir) Rash Behary Ghose waited on Lord Hardinge and expressed apprehension that the creation of a separate university at Dacca would be in the nature of 'an internal partition.' In reply, Lord Hardinge said that no proposals which could lead to the internal partition or division of Bengal would meet with the support of the Government of India; and he added that from the fact that he announced the intention of the Government in regard to Dacca to a deputation of Muhammadans it did not follow in any way that the new university would be a Muhammadan university; it would be a university open to all—a teaching and a residential university.

4. The Government of India, after receiving the general assent of the Secretary of State, announced their decision to establish a university at Dacca in a letter to the Government of Bengal dated 4th April, 1912, and invited that Government to submit a complete scheme with a financial estimate. The letter stated that the

Government considered the creation of new universities as an important factor in educational progress and that it was desirable that these universities where possible should be of the teaching and residential type, binding together the colleges of a single town or a single circumscribed area. The University of Dacca was in the first place "to serve as an example and test of the new type of university and in the second to afford some relief to the congested state of the Calcutta University." The letter also drew attention to the particularly high level of general intelligence of Hindu middle-class population of Eastern Bengal, and to the desirability of making accessible to the Musalmans of Eastern Bengal a university in which they could have a voice (there being only six Muslim members on the Calcutta University Senate out of a total of 100, excluding *ex-officio* members) with a view to increasing the number of students of the Muslim community in the college classes. The letter further suggested that there might be a Faculty of Islamic Studies in the University.

5. On 27th May, 1912, the Government of Bengal published a resolution in regard to the proposed University and appointed a committee of thirteen members with Mr. R. Nathan, as President, to frame a scheme. The resolution emphasised the desire of the Government of India that "the university should be of the teaching and residential and not of the federal type,"<sup>1</sup> and that "it should bind together the colleges of the city and should not include any college which is beyond the limits of the town."

6. The Committee acted with great promptitude and thoroughness. It obtained the advice of 25 special sub-committees, and in the following autumn submitted its report to the Government of Bengal with plans of the proposed buildings and estimates of capital expenditure amounting to 53 lakhs<sup>2</sup> and of recurring expenditure amounting to 13 lakhs; and made suggestions in great detail as to the work of the University and its courses of studies.

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<sup>1</sup> To avoid misunderstanding, it may be pointed out that both in the official documents and in the evidence relating to the University of Dacca the term 'federal university' is occasionally used as a term equivalent to and interchangeable with the term 'affiliating university.'

<sup>2</sup> This estimate was subsequently increased by the Public Works Department to Rs. 67,11,736.

7. The main outlines of the scheme may be summed up as follows :—

(a) *Relation to Government.*—The University was to be a *Staté* university maintained by the Government and staffed by Government officers. The Director of Public Instruction was to be the “official Visitor, with full powers to inspect all colleges and departments.”

(b) *Colleges.*—The college was to be the unit of university life, and the expansion of the University was to be provided for by an increase in the number of colleges. The number of students in any college was not to exceed 600; and the scheme provided for the residence of 2,890 students in seven colleges—the Dacca, Jagannath, Muhammadan, Women’s, ‘Well-to-do,’ and Teachers’ Colleges. The Muhammadan College was to provide for Islamic studies. The scheme also provided special university departments of science, engineering, law and medicine and of post-graduate studies in arts and science. The students of these departments were to reside in the above named colleges. The Committee decided that there was no scope at Dacca for an agricultural institution of university grade, but suggested the foundation of an agricultural school in connexion with the Government farm.<sup>1</sup>

(c) *Teaching.*—The Committee recommended that the entire teaching in science, law, medicine and engineering and the post-graduate teaching in arts should be conducted by the University in one place. They proposed that the intermediate teaching in arts should be carried on by the several colleges independently and that the teaching for the B.A. pass and honours degrees should be conducted by the colleges, with inter-collegiate arrangements. Tutorial classes in groups of 20 were recommended for B.A. pass students.

(d) *Staff.*—The scheme divided the majority of the members of the staff, according to the salaries, into the four classes set out in the table below :—

- (i) Members of the Indian Educational Service (with four professors to be specially recruited at an average salary of Rs. 1,800 a month).
- (ii) Members of the Provincial Educational Service.
- (iii) Members of the Subordinate Educational Service.
- (iv) Junior assistants (to be young graduates appointed on short terms of office with fixed salaries).

The four principals of colleges were not included among the regular staff; they each were to receive the pay of a professor, together with an allowance of Rs. 200 a month.

The members of the staff in the arts departments, with the exception of a certain number of professors, directly under the University, were to be definitely divided between the colleges, but the members belonging to other departments were to be allowed to elect to which college they would belong, subject to the approval of the colleges in question and the university authorities. Every member of the staff was to belong to a college.<sup>2</sup>

<sup>1</sup> Dacca Report, Chapters III and IV.

<sup>2</sup> *Ibid.*, Chapter X.

*Total of staff recommended by the Dacca-University Committee.*

Department.	Indian Educational Service or rank approximate thereto. <sup>1</sup>	Provincial Service or rank approximate thereto. <sup>1</sup>	Subordinate Service or rank approximate thereto. <sup>1</sup>	Junior assistants.	TOTAL
Arts . . . . .	14	30	7	25	76
Science . . . . .	8	13	17	9	47
Arts or Science (4 Principals)	4	..	..	..	4
Islamic Studies . . . . .	3	5	..	..	8
Law . . . . .	3	5	..	..	8
Medicine . . . . .	1	1	1	..	3
Engineering . . . . .	5	4	5	..	14
Teaching . . . . .	1	3	3	..	7
College for Women . . . . .	3	2	2	5	12
College for the 'Well-to-do' classes	3	4	2	2	11
TOTAL . . . . .	45	67	37	41	190

The average number of students per teacher, under the scheme, taking all the colleges and departments of the University together, was 15·2, and the average for the students of arts and science departments only was 18. (The maximum proportion recommended in 1906 by the Calcutta University Committee on mufassal colleges was 15.)

(e) *Islamic Studies*.—The Department of Islamic Studies was to provide university instruction for the students of the reformed madrassahs which were to be established in Bengal on the recommendation of the Madrassah Reform Committee,<sup>2</sup> the object being to produce Arabic scholars with a thorough knowledge of English. The Department was to be organised by a European professor with an average salary of Rs. 1,000 a month.<sup>3</sup>

(f) *Engineering*.—The Committee, at the instance of the Government of Bengal (which had at that time decided to remove the Civil Engineering

<sup>1</sup> The report is not explicit in regard to the relationship of a number of the teachers to the services, and it would appear from Appendix X and the sections which it summarises that in all the categories except that of the College for the 'Well-to-do Classes' some teachers, and especially senior teachers, were to be recruited under special conditions. No accurate classification of the staff proposed by the Committee could be compressed into a small space, but the headings adopted in the above table give a general idea of the classes into which the staff proposed was divided.

<sup>2</sup> Chapters VI, para. 60, and XVI, paras. 65-73.

<sup>3</sup> Dacca Report, Chapter XIX.

College from Sibpur) discussed the question of establishing a civil engineering college at Dacca, and recommended the establishment of such a college as one of a group of three technological institutions, of which the others were to be the existing Engineering School, and an industrial institute to be created in accordance with the recommendation of a conference held at Dacca in 1909. Of these institutions, the college alone was to form part of the University; the other two were to be under the proposed Department of Industries.<sup>1</sup>

(g) *Medicine*.—Arrangements were to be made for a medical department admitting 50 students a year and teaching them up to the standard of the first M.B. examination of the Calcutta University, which the Committee thought might be done with slight additions to the staff of the existing Medical School. The University was to conduct its own first M.B. examination, which was to be recognised by the University of Calcutta, all students who had passed being entitled to admission to the Calcutta Medical College. The Department was ultimately to be developed into a full medical college.

(h) *Teachers' College*.—Dacca University Teachers' College was to provide instruction for 80 students. The college was to provide—

- (1) a one year's course for an annual entry of 50 students leading to a diploma in teaching,
- (2) a two years' course for an annual entry of 15 students leading to the degree of B.T.

The college was to be developed from the existing Training College; it was to be removed to a site in the south of Dacca, in close touch with six large high schools (for which a scheme had been framed) and these were to serve as practising schools. While the college would be at a considerable distance from the university buildings, it was hoped that the students would become members of the university societies and take part in university athletics and that the university professors not attached to the Training College would give occasional lectures to the students.<sup>2</sup>

(i) *Law*.—The Committee recommended, as a compromise between opposing views, that "while the teaching of law should be entirely under the Dacca University, students should be examined by, and receive their degrees from, the University of Calcutta, which should accept for examination any student duly presented by Dacca." Provision was to be made for an annual entry of 60 in each of the three years of the course.<sup>3</sup>

(j) *College for Women*.—The Committee recommended the establishment of a college for women with hostel accommodation for 40 students. The college was to provide at the outset admission for about 12 students every year, but was expected to increase in numbers. The course pursued was to include domestic subjects, and in all other subjects was to be identical with that for men. All the professors of the college were to be women.<sup>4</sup> The new college and the Eden High School for Girls were to be amalgamated as one institution under the name 'Eden College and High School for Girls;' but while the high school was to continue as a *pardah* school, it was thought impossible to enforce an equally strict seclusion in the college,

<sup>1</sup> Dacca Report, Chapter XX.

<sup>2</sup> *Ibid.*, Chapter XXIII.

<sup>3</sup> *Ibid.*, Chapter XXIV.

<sup>4</sup> *Ibid.*, Chapter XXI.

and contiguous but separate buildings with separate entrances were there fore to be provided.<sup>1</sup>

(k) *Entrance qualification*.—The Committee considered that for the present the matriculation certificate of Calcutta should remain the sole general entrance qualification in arts and science for Dacca, but did not wish the decision to be regarded as final; they thought the matter might well be reconsidered after experience had been gained of the working of the new University. The Committee recommended that schools in the town of Dacca should be inspected and recognised by the Dacca University.<sup>2</sup>

(l) *University authorities*.—The Committee recommended that the government of the University should be vested in a Chancellor, Vice-Chancellor, Convocation and Council; that the Governor of Bengal should be the Chancellor, and the position to be assigned to him and to the Vice-Chancellor “should be as in other Indian universities.” The Vice-Chancellor was, however, to be a salaried officer appointed by Government.

(i) Convocation was to comprise about 140 members, including all the university professors, 25 graduates elected by the general body of registered graduates, 5 Muslim graduates elected by the registered Muslim graduates; and 10 Muslim graduates, residents of Bengal and Assam, and 21 other persons, of whom two-thirds were to be non-official, all appointed by the Chancellor. Convocation was to exercise legislative functions, subject to the control of Government.

(ii) The Council was to comprise about 20 members, consisting of (1) the Vice-Chancellor, acting as Chairman, (2) the Commissioner of Dacca, (3) the principals of the incorporated colleges, (4) six professors appointed by the Chancellor, including two ‘college professors,’ (5) six persons elected by Convocation from among its own members, at least two being Musalmans.

The Council was to be the supreme executive authority of the University and to be responsible for its general and financial administration.

(iii) There were also to be established by regulation (a) 16 special boards of studies, including engineering, medicine, and law, (b) a general board of studies, with the Vice-Chancellor as President, and (c) five other committees.

(m) *Site and buildings*.—The Committee proposed to devote to university purposes a splendid site of about 450 acres forming part of the civil station of the Government of Eastern Bengal and Assam at Ramna, and lying roughly speaking from 1 to 1½ miles north-west of the centre of Dacca. The site included the Dacca College, the new Government House, the Secretariat, the Government Press, a number of houses for officers and other minor buildings adjacent to it. On the south side of the railway, adjacent to the above site, lies a vacant space of 130 acres, which the Committee proposed to devote to playing fields. The report of the Committee contains elaborate plans. (Four ‘lay outs’ have been designed since the original one of the Committee, the latest being an attempt to bring all the teaching

<sup>1</sup> Dacca Report, Chapter XVII.

<sup>2</sup> *Ibid.*, Chapter V.

institutions 'except special ones like the Teachers' and 'Women's Colleges' within a circle with a radius not exceeding one-third of a mile.)

8. The Government of Bengal published the report<sup>1</sup> and invited the fullest criticisms from persons of all classes. After consideration of these criticisms detailed plans for the setting up of the University were framed and formed the subject of communications between the Government of Bengal, the Government of India and the Secretary of State. Definite action would presumably have been taken in connexion with the scheme but for the out-break of war in 1914 and the consequent stringency which led to a modification and postponement of the financial proposals.

9. On 7th March 1917, Government announced in the Imperial Legislative Council, in reply to a question by Nawab Syed Nawabaly Chaudhury, Khan Bahadur, that action in regard to the Dacca scheme would be postponed until the present Commission, then about to be appointed, had reported; and on 20th March the Nawab moved in the Imperial Legislative Council that—

"this Council recommends to the Governor General in Council that the necessary steps be taken to draft a bill for the establishment and incorporation of a university at Dacca, and introduce it into the Council at an early date."

The Nawab said that Eastern Bengal had been assured of a university as a 'compensation' for the territorial readjustment, and that serious misgivings were entertained when the war broke out lest the university question might be indefinitely shelved or postponed. He suggested that if the money difficulty were pressing effect might not be given to the whole scheme at once, though provision should be made 'for the fruition of the full scheme' in course of time; but that a small beginning should be made at once.

10. Sir Sankaran Nair, on behalf of the Government, stated that the Government were definitely pledged to the establishment of a university of Dacca and that although there had been doubts as to the scheme of the University, there had been no wavering on the part of Government on the main question; that a bill for its

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<sup>1</sup> Report of the Dacca University Committee (Bengal Secretariat Book Depôt, 1912.) The report was first published at a higher price, which was reduced to the nominal one of 4 annas. A note signed by Mr. J. H. Kerr, of the Government of Bengal, was issued on 23rd December 1912, stating that the Governor in Council would be glad to consider any criticism on the proposals of the report, received before 15th February.

establishment had already been drafted ; but that Government had delayed introducing the bill for several reasons. He said that it was the policy of Government that during the period of the war they should not pass a controversial measure through the Council by official majority ; that Government had found that certain proposals common to the Dacca Bill and the Patna Bill had proved controversial ; that those provisions had been modified in the case of the Patna Bill, so that it might go through as a non-controversial measure ; but that Government had not had time to consider whether corresponding modifications could be made in the Dacca Bill ; he added, further, that essential features in the Dacca scheme had been criticised as being opposed in principle to the report of the recent Royal Commission on the University of London, and also from an opposite standpoint ; and that according to the latter category of critics, the poverty of the classes in India who resort to university education, and the purely utilitarian character of the English education which they sought, rendered it undesirable to introduce in India the type of university advocated by the London Commission.

“ The various differences between the castes, the classes and the religions make it difficult,” they say, “ to accept the ideal of a university where all the professors and all the students work with common ideals ; and the great area over which the classes are distributed who seek university education, these make it impossible, according to eminent educationists in India, to import into India that type of university which requires the colleges to be grouped at a centre.”

Sir Sankaran Nair refrained from expressing an opinion on any of these criticisms ; he pointed out further that Government had by some been accused of sinister motives in advocating a residential type of university ; it was said that this policy was advocated “ not really for the improvement of higher education in India, but with a view to check the expansion of such higher education.” In these circumstances Government would not object to introduce a bill for the establishment of a university of Dacca, but the final consideration of the bill, even if introduced, would still have to wait for the report of the Calcutta University Commission.

11. In view of the statement of Sir Sankaran Nair the Nawab withdrew his resolution ; and at the conclusion of the session of the Imperial Legislative Council, on 23rd March 1917, His Excellency Lord Chelmsford, referring to Sir Sankaran Nair's speech, stated that he desired to confirm in the most distinct and unequivocal

vocal manner the promise made by Lord Hardinge that a university would be founded at Dacca.

12. We have had before us various official communications referred to by Sir Sankaran Nair in his speech ; but it would complicate the exposition of the situation unnecessarily to enter into an analysis of all the proposals and counter-proposals made at different times.

13. It will be convenient however to print the major portion of the last official document published on the Dacca scheme, namely, the *communiqué* of 26th November 1917 of the Government of Bengal which appeared early in December :—

“In 1912 the Government of India announced their intention of founding a university at Dacca, which would be of a teaching and residential rather than of a federal type, and the Government of Bengal appointed a committee to frame a complete scheme. The report of the Committee was published in 1913, and criticisms and advice from the public were invited. After full consideration of the recommendations of the Committee and of the views expressed by the public, the scheme, with certain minor modifications, was submitted to the Secretary of State and received his general approval in December 1913. The approved scheme comprised the foundation of four new colleges (*viz.*, a new general college, a Muhammadan college, a women's college and an engineering college), the establishment of a medical institution, a department of Islamic studies and a Sanskrit department and the separation of the Law College from the Dacca College and its establishment as an independent law institution. The Teachers' College was to be transferred to a new site and the Jagannath College to the proposed university area, while a hostel was to be started for students of the well-to-do classes. The building of a library, a museum, an observatory, a gymnasium and several laboratories were contemplated. Other features of the scheme were the introduction of seminar teaching, the provision of reading rooms, the laying out of playing fields and the organisation of a university library, a university union and a professors' club.

Unfortunately the war broke out next year, and the necessity for stringent economy in all departments of public expenditure made it impossible to carry out the full scheme at once. It was accordingly proposed in 1915 that a commencement should be made on a reduced scale. The essential portions of the original scheme were retained, but it was proposed to omit for the time being the new college, the engineering college, the department of Sanskrit studies and the hostel for well-to-do students, the natural history museum, the observatory and some of the laboratories. At the same time it was proposed that the Muhammadan College should be placed in a part of the old Secretariat buildings and that the building project for the Women's College should be modified.

The financial difficulties caused by the continuance of the war precluded the execution of the reduced scheme, and in 1916 the Government of India asked the Government of Bengal to submit an estimate of the minimum expenditure necessary for starting a university which would be of the type

originally proposed and which would, at the same time, satisfy reasonable demands for the provision of collegiate education in excess of that available in the existing colleges at Dacca.

A further modification of the scheme was then proposed on lines which would admit of the gradual development of the University on those laid down by the Dacca University Committee and approved by the Government of India and the Secretary of State. It was suggested that the University should start with four colleges (besides the Teachers' Training College), *viz.*, the Dacca College, the Jagannath College, the Muhammadan College and a new arts college. The establishment of the last was proposed in order to meet the demand for fuller provision for collegiate education in Dacca which had been caused by the increasing number of students. The new Arts College was to be started in temporary premises and the Muhammadan College in the old Secretariat buildings. The Dacca College was to remain as at present, the Law College being separated from it and accommodated in the old Secretariat buildings, while the Jagannath College was to be moved to the building erected for the Eastern Bengal and Assam Government Press. The hostel for well-to-do students, the college for Women and the medical institution were to be deferred. The physics and chemistry laboratories were to be given accommodation in existing buildings, and more modest proposals were put forward in connection with physical education and the social life of the teachers and students. The capital cost of this last scheme was estimated at Rs. 11,25,000. The corresponding figures for the scheme originally approved and of the reduced scheme proposed in 1915 are Rs. 67,12,000 and Rs. 38,40,000, respectively.

In the meantime, the Government of India had decided to appoint a commission which would examine the question of university education in Bengal generally; and as expenditure on the proposed University had necessarily to be postponed on account of financial stringency, it was determined that the scheme should be referred to the Commission. Government, as explained by His Excellency the Viceroy at the meeting of the Imperial Legislative Council held on 23rd April 1917, adhere to their intention of instituting a university at Dacca; and they hope to receive from the Commission valuable advice regarding its constitution and management."

## II.—Discussion of the main features of the scheme proposed by the Commission.

14. The question of the University of Dacca is covered by our general reference and is not limited in any way by specific terms therein. We have therefore regarded it as our duty to reconsider the question *de novo* both in regard to general policy and details. We have however naturally given very careful attention to the scheme put forward by the Dacca University Committee, on which we have invited expressions of opinion in our questionnaire;<sup>1</sup> we

<sup>1</sup> Part I of Question 4 reads: "If you have studied the Dacca University scheme, have you any suggestions to make with regard to it." (Part II of the question refers to the possibility of establishing universities in the mufassal elsewhere than at Dacca.)

have also examined the other official documents relating to the scheme which have been communicated to us ; and we shall set out, in so far as may seem required, the reasons which have led us to concur in, to amend, or to differ from the original proposals or those made subsequently in regard to the Dacca University.

15. It will be apparent from other portions of this report that even if the establishment of the University of Dacca had not been promised by the Government of India, the whole policy of university reorganisation in Bengal which we advocate would have led us to recommend the establishment of a university in that town either immediately or at an early date.<sup>1</sup> For if the scheme of decentralisation, of relieving the excessive burden of Calcutta, and of gradually creating separate universities in the mufassal is to be carried out, Dacca is clearly indicated as the first centre for the creation of such a university, and this for cogent reasons. The town itself, with about 120,000 inhabitants,<sup>2</sup> is the second in the Presidency ; it has the prestige of an ancient and historic capital ; it is now a commercial and manufacturing centre of growing importance ; it has better communications by rail and river than any other centre in the thickly populated districts of Eastern Bengal ; it is contiguous to Vikrampur, the home of so many of the *bhadralok* of Bengal ; and it already possesses two first-grade colleges, with a total of over 1,800 students, providing university teaching in arts, science and law. It also possesses institutions of a non-university character providing teaching in medicine and engineering, and a Government agricultural farm.<sup>3</sup> Dacca College, the larger of the two colleges, is a Government institution with excellent buildings and is the best equipped of all the colleges in the mufassal ; it is placed on fine open park land (the Ramna) between one and two miles from the centre of the town, with admirable sites for building lecture-rooms, libraries, laboratories, hostels, and for providing play-grounds ; and on that site, owing to the very course of events which led to the proposals of the scheme, there are already a num-

<sup>1</sup> See especially Chapter XXXV, on Mufassal Colleges.

<sup>2</sup> According to the last census the population of Dacca was over 108,000 in 1911. Mr. S. G. Hart, the Collector of Dacca, estimates the present population at the figure stated in the text.

<sup>3</sup> Dacca has recently been made the administrative centre for the Government Department of Agriculture.

ber of large and well constructed buildings, originally designed for, but no longer required by, the Government. These can now be utilised with the greatest economy for university purposes.

16. The Dacca district supplies over 900 students to the local colleges and sends another 1,491 to other colleges all over Bengal, while the Dacca Division and the neighbouring districts of Tippera supply altogether about 7,097 out of the total number of 27,290 students in the University of Calcutta.<sup>1</sup> Dacca is therefore already in the centre of a great student population, and there can be no doubt that increased and better provision for university education of a high order, besides tapping fresh sources of supply among the Muslim population, will attract an increased number of students from the neighbourhood and so relieve to some extent the pressure at Calcutta.

17. As a sign of existing public opinion in educated circles it may be interesting to mention that out of the 307 of our correspondents who replied to Question 4 of our questionnaire only 15 expressed views opposed to the establishment of the University of Dacca.

18. The chief determining factor in the decision of the Government to make Dacca the seat of a university was, doubtless, the desire to accede to the demand for further facilities for higher education for the Muslim population who form the majority in Eastern Bengal. It is one to which we naturally attach great weight; and we are entirely in sympathy with the wish of Government that the Dacca University should be used to the fullest possible extent as a means of encouraging the desire for higher education among the still backward Musalmans of this part of the province. On the other hand, we desire emphatically to endorse the view that the University should be open to all, and that it should be in no sense a sectarian university; nor do we believe that in this we differ from the wish of the representatives of the Muslim community.

19. Turning from these great issues, on which we believe that there can be no serious differences of opinion, we come to three

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<sup>1</sup> There were in 1917-18, 1,633 students in the two colleges in Dacca, drawn from various districts, as follows:—Dacca 961, Bakarganj 80, Mymensingh 167, Faridpore 151, Tippera 274. It is significant to note that about half the students come from the Dacca district and more than one-third from the four neighbouring districts.

main features in which the University of Dacca was to differ from universities of the type existing in 1912—

- (1) The University was to be a unitary as opposed to a federal or affiliating university ; it was, like the older universities of England and the modern Universities of Manchester, Liverpool and Birmingham, to be associated with a particular city.
- (2) The University was to be a teaching and residential university. Speaking broadly, we emphatically endorse these two main features of the scheme.
- (3) The University was to be a Government institution. Here we differ from the proposal of the Dacca University Committee. We have elsewhere<sup>1</sup> expressed the view that while in our judgment the State ought to remain ultimately responsible for the inspection and supervision of higher education, there are many drawbacks to the system of direct and detailed State control. We propose for the University of Dacca an organisation corresponding in its chief features with that which we propose for the University of Calcutta, but simpler in structure because of the simpler functions which it will fulfil.

20. In two other important points our scheme also differs from that proposed by the Dacca University Committee :—

- (a) As indicated in Chapters XXXI and XXXII, we regard intermediate classes as, belonging properly to school and not to university education, and we think it to the interest alike of the students and of the universities that these classes should be conducted in special institutions which we have called intermediate colleges. A certain number of such intermediate colleges should be created in Dacca without delay.<sup>2</sup>
- (b) The second point is connected with the first. The college, under the Dacca Committee scheme, was to be wholly responsible for the intermediate teaching ; but it was to be only partially responsible for the pass teaching for the degree, which was to be organised on an inter-

<sup>1</sup> Chapters XXVIII and L.

<sup>2</sup> See paras. 211-213 below.

collegiate system ; and it was not to be responsible at all for honours or for any science teaching, which was to be conducted by the University. Under the terms of the Draft Bill prepared for the University the responsibility for post-intermediate teaching was to be transferred entirely to the University, an arrangement which seems to us based on sound reasons of economy and policy. By the removal of the burden of the intermediate classes from the University and, under the arrangement proposed, the college will, if our proposals are adopted, play a different part from that contemplated in the original scheme, though it will retain functions of vital importance in a residential university like Dacca. In order to avoid confusion of ideas we propose that the change (or partial change) of functions should be accompanied by a change of terminology and suggest that in the Dacca scheme the term 'hall' be substituted for the term 'college.' We shall develop in paragraphs 36-47 and 135-144 below our conception of the hall.

21. We shall in the first place discuss the criticism aimed at the proposal to make Dacca a unitary as opposed to an affiliating or a federal university, a matter in which we agree with the Dacca University Committee ; and shall then deal with the main points in which our scheme differs from that of the Dacca Committee. While we adhere to the view of the Government of India that the University of Dacca should be a teaching and residential and not an affiliating university, we cannot overlook the fact that since the Dacca Committee reported a new type of university which is both teaching and affiliating has been founded at Patna. The Patna model has been advocated by some of our witnesses for two reasons, the first a desire to relieve the examinational congestion of Calcutta, the second, the presumed interests of other colleges in Eastern Bengal. With one exception, to which we shall draw attention, the proposals for making Dacca an affiliating university do not claim to be made in the interests of Dacca.

22. Dr. Hiralal Halder of the Calcutta University and the City College puts the argument on behalf of Calcutta:—

"The Dacca University should be of the same type as the Patna University. It should, of course, be a teaching university, but its proposed consti-

tution should be so modified as to allow of the affiliation of colleges in eastern and northern Bengal to it. This is necessary to give relief to the Calcutta University. It has become difficult for this University to examine properly and control the enormous number of students that appear at its matriculation and intermediate examinations. For example, so many examiners are appointed to look over the answer papers of thousands of candidates that it has become difficult to maintain the uniformity of the standard of examinations. A single university is no longer sufficient for the requirements of a province like Bengal."<sup>1</sup>

Maulvi Khabiruddin Ahmed writes, in advocacy of the same policy<sup>2</sup>—

"the Calcutta University has become a huge and unmanageable examining body, and it is desirable to remove the congestion by cutting down its territorial limits"

and suggests that while the Dacca University should be an exclusively teaching and residential university so far as the colleges at Dacca are concerned it should have 'federal jurisdiction' over the colleges in Eastern Bengal.

23. Among some of our Muslim witnesses there is an impression that the colleges of Eastern Bengal would receive better treatment at the hands of Dacca than at those of Calcutta; and they combine this argument with that of the unwieldiness of Calcutta to press the claim that Dacca should be affiliating. The Muslim deputation whom we received at Rajshahi said in their address (section 9)<sup>3</sup>:—

"At present the Muhammadans, on account of their want of representation and of many incidents brought to notice, have no confidence in the Calcutta University and therefore we desire that Rajshahi College should be affiliated to the Dacca University which, as we are given to understand by Government, will specially look after the interests of Muhammadans. This University was promised to the deputation of Muhammadans of Eastern Bengal as a compensation for the loss of the separate province, and we are confident that this University will look after Muhammadan interests; we therefore press that all colleges in Eastern Bengal should be affiliated to the Dacca University. This will also relieve pressure on the Calcutta University which is at present unwieldy."

24. The influential Muslim deputation which we received at Calcutta urged a similar though not identical view.<sup>4</sup> They emphasised "the utmost desirability of establishing teaching univer-

<sup>1</sup> Question 4. See also evidence on this point of Mr. Umes Chandra Haldar, and Mahamahopadhyaya Pramathanath Tarkabhusana.

<sup>2</sup> Question 4.

<sup>3</sup> General Memoranda, page 218.

<sup>4</sup> See Memorandum of Musalmans of Calcutta, part. 4, General Memoranda, page 219.

sities at Calcutta and Dacca and other places such as Chittagong, Rajshahi, Berhampur and Gauhati." They suggested, as a second alternative, if it seemed impossible to create teaching universities elsewhere than at Calcutta and Dacca, that a new university of the existing type, independent of Calcutta and Dacca, should be set up to control the mufassal colleges—to be called the University of Bengal. Their third alternative, which coincides with that of our previous witnesses, was that the colleges of Eastern Bengal should be affiliated to Dacca and not to Calcutta; but this suggestion was made subject to the proviso that the scheme would not in our opinion prejudice the legitimate duties of Dacca as a teaching university.

25. Nawab Syed Nawabaly Chaudhury goes further. He puts forward the separate treatment of the mufassal colleges of Eastern Bengal as the first consideration; he thinks that it will be difficult to reconcile the interests of the people with the best interests of Dacca University; and urges that if his proposal for separate controlling agencies for the eastern and the western mufassal colleges proves impracticable on financial grounds, then the—"colleges in Eastern Bengal, instead of being treated together with the colleges in Western Bengal under one university, should be affiliated to the Dacca University, even though, as a consequence, the efficiency of teaching might, to a certain extent, be impaired; for the people of Eastern Bengal strongly feel that the interests of their higher education would continue to suffer as before, if their colleges are not treated separately."<sup>1</sup>

26. The one witness who appears to regard the power to affiliate colleges in Eastern Bengal (and Assam) as likely to be of benefit to the University of Dacca is Mr. J. R. Cunningham, the Director of Public Instruction for Assam.

"To grant it territorial jurisdiction," he writes, "would be to secure to it the widest charter of liberty and to afford to university education in India the largest hope of advancement and reform. To restrict the University to the city of Dacca and leave the Assam and mufassal colleges unattached will be to subject the growth and development of the new venture to all the adverse influences of competition"

and he draws a gloomy picture of the necessary acceptance by Dacca, in large measure, of "the most characteristic and detrimental conditions of the present state of things," including:—

"(1) Matriculation at 16 when the student, yet unripe for university study, is so ill-qualified in English as to render lectures difficult of understanding and to confirm the habit of study by memorising.

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<sup>1</sup> Question 4.

(2) Extension of the ordinary university course to four, instead of three, years with a qualification at the end of the second year which serves as the goal for the mass of the students, thus occupying the energies of the University in work which is merely secondary and which should belong properly to the schools."

27. In Chapter XXXI we have recommended that the minimum standard for entrance should be the present intermediate standard, a standard which we hope to see raised not by a mere increase in the difficulty of the questions, but by the improved teaching in the intermediate colleges<sup>1</sup>; and we also hope that the period of undergraduate studies will be the three years which Mr. Cunningham desires; so that at any rate some of the dangers which he foresees will be avoided. Mr. Cunningham fears that competition with Calcutta (unless Dacca is artificially fed by the affiliation with it of colleges from Eastern Bengal) will lead to a lowering of standards. The same fear was expressed in Great Britain when the modern universities were created from 1880 onwards. But those fears have not been realised; on the contrary the standards have steadily risen. We may point out that if it becomes known that a university gives cheap degrees, the holders of these degrees will soon find that they stand less chance in competitions for an appointment than graduates of more scrupulous universities and that the University itself will lose in popularity except with the weakest candidates; the best students will, in their own interests, both intellectual and worldly, go to the University which maintains not the lowest but the highest standards of teaching and of examination. If Dacca cannot compete in the open market and by fair means with Calcutta in the same way that the new universities in Great Britain compete with London and the older universities and with each other, our scheme will have failed from the inside. But we do not think it will fail.

28. It would, in our judgment, be inadvisable to load the new University of Dacca with the burden of affiliation and the accompanying disadvantages of impaired efficiency recognised by Nawab Syed Nawabaly Chaudhury. Such a system would necessarily absorb time and energy on the part of the teachers and of the

<sup>1</sup> We have also recommended, Chapter XXXI, para. 55, that in exceptional cases students should be allowed to take the examination corresponding to the present matriculation at 15: but the minimum age of entrance to the University would be 17. As at present the average age of matriculation is 18½, the average age of entrance would be over 20.

administrative bodies at Dacca which should properly be devoted to the development of their own university; and so far as we are aware, none of the existing Dacca teachers have expressed any desire for it.<sup>1</sup> The affiliating nexus would tend to restrict the natural development of Dacca on its own lines; there would be a constant conflict between the legitimate claims of Dacca, the strongest centre, that it should be allowed to progress, and the equally legitimate claims of the weaker mufassal colleges that they should not be overpressed; and the fair settlement of these constantly occurring differences would require the creation of a complex administrative machinery for the drafting of syllabuses, the conduct of examinations and the adjustment of standards. We have found it necessary to provide such machinery in our scheme for the University of Calcutta.<sup>2</sup> To duplicate it in the case of Dacca would, in our judgment, be wasteful and unwise and would confer no corresponding benefit on the mufassal colleges in question. Moreover our tour in Eastern Bengal leads us gravely to doubt whether affiliation to Dacca would be welcomed by the majority of the colleges; there would certainly be serious, possibly bitter, differences of opinion in regard to such affiliation. As for the interests of Muslim students throughout Bengal, we have had them so constantly in mind that we do not think they will suffer either in the University of Calcutta or Dacca under the schemes which we have proposed. For the grounds above stated, we reject wholly the proposals for making Dacca an affiliating as well as a teaching university.

29. Some of our correspondents have proposed that Dacca should be made a 'federal' university. It is of the essence of a federal university in the sense in which the term is most commonly used that all its units should take some share (though not necessarily an equal share) in the management of the University as a whole. But most of our correspondents who use the word 'federal' do not appear to contemplate any departure from the ordinary methods of affiliation prevailing in India,<sup>3</sup> under which the affiliated college

<sup>1</sup> See evidence in response to Question 4 of Mr. F. C. Turner, Principal, Dacca College, of Rai Lalitmohan Chatterjee Bahadur, Principal, Jagannath College, Dacca, of Rai Bhupatinath Das Bahadur, of Maulvi Mohammad Irfan, and of Messrs. Walter A. Jenkins and G. H. Langley of Dacca College.

<sup>2</sup> Chapters XXXIV, XXXV, and XXXVII, especially Chapter XXXVII, paras. 70-82.

<sup>3</sup> Cf. evidence of Mr. Birendra Kumar Datta, who suggests that Dacca "should be of federal type, all the secondary schools and colleges in the Dacca and Chittagong

has no claim whatever to a voice in university management.<sup>1</sup> Federal universities may, no doubt, be useful in certain conditions, when college units of approximately equal strength are situated in different towns within fairly easy reach of one another. But the Dacca colleges and the other colleges of Eastern Bengal do not bear this relation to one another, and no one has put forward a considered scheme for the creation of a federal university in the sense above defined and embracing all these colleges. To any such scheme of federation we should feel objections no less strong than those we have expressed to the scheme for an affiliating university at Dacca.

30. It was natural that the Dacca University Committee in planning a teaching and residential university should propose that the unit both for teaching and residential purposes should be the college. They had in mind not only the older universities in England, but the traditions of Indian experience since 1857. We have seen in Chapter III how the idea of a college preceded in India the idea of a university, and how the University was created as an organism external to and controlling the colleges by means of curricula and regulations and examinations, but without any teaching functions. Without repeating details unduly we may recall the main facts necessary for the understanding of the policy of the Dacca University Committee.

31. The Universities Commission of 1902 referred to the narrowly restricted powers of the then existing universities and stated that there was a very general desire that those powers should be enlarged and that all universities should be recognised as teaching bodies.<sup>2</sup> They passed over the contention put before them that the indirect control over teaching exercised by the existing universities entitled them to be called teaching universities; and explained that in usual parlance a 'teaching university' denotes a university 'which makes direct provision for teaching by appointing its own profes-

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Divisions being affiliated to it," and Kumar Kshitindradeb Rai Mahasai who proposes that Dacca should "exercise a federal control like that of an examining body" over the mufassal colleges of Eastern Bengal. Dr. D. N. Mallik (who does not suggest such control) pleads for the federal universities on the ground that while single college universities are desirable, there is not the teaching strength necessary to man them at present in Bengal.

<sup>1</sup> See footnote to para. 5 above.

<sup>2</sup> Report, para. 21.

sors and lecturers.' The Commission, (who did not contemplate the possibility of any departure from the Indian affiliating system) pointed to the fact that the affiliated colleges were spread over a wide area, that it was not easy to see how their students could be brought together to attend university lectures, and that the better among them already made adequate provision for the courses of instruction leading up to the B.A. and B.Sc. degrees, so that any intervention of the University at this stage appeared unlikely to be profitable. They very naturally regarded the question whether and how far the universities would be able to make direct provision for teaching as one of considerable difficulty; especially as they saw no source from which the universities could hope to obtain the funds which would be required 'for the entertainment of a staff of university professors in every branch of learning.'

Their conclusion on this point was as follows:—

"We think it expedient that the undergraduate students should be left in the main, to the colleges, but we suggest that the universities may justify their existence as teaching bodies by making further and better provisions for advanced courses of study. The University may appoint its own lecturers and provide libraries and laboratories. It would also be proper that the University should see that residential quarters are provided for students from a distance."<sup>1</sup>

They suggested that the colleges co-operating in the scheme should contribute to its cost, that in this way central schools of advanced study might in time be formed, and that it was an advantage of the scheme that it could be worked out gradually without the great initial expense involved in the creation of a complete professoriate.

32. The Dacca Committee, writing in 1912, were justifiably bolder and more explicit in their view of what the Indian Government and public regarded as the idea of a university. Between 1902 and 1912 public opinion had advanced; and the ideas latent in the report of 1902 were developed with a new fulness and warmth by the Dacca Committee. "There are," they say in the first chapter of their report—

"abundant indications that the Government and the people have alike come to realise that a university, if it is to satisfy in full measure the requirements of the educated classes, must denote more than mere examination, must undertake more than mere control, must offer more than mere instruction. It must be an institution in which a true education can be obtained—the training of the mind, body and character; the result 'not a book but a man.'"

<sup>1</sup> *Loc. cit.*, para. 24.

But for the Committee of 1912, as for the Commission of 1902, the college was to be the unit of university life for teaching as well as for residence. Indeed they regard the separateness of the colleges as of positive advantage to the university as a whole.

"We anticipate", they wrote, "that each college of the Dacca University, whether it is one now in active working, or yet to be founded as part of this scheme, will have its special characteristics and develop in its own way. The individuality and variety of the colleges is as much a part of the scheme as the completeness and community of the new university life. There will be, in a way never before known in India, a healthy interaction of the colleges upon each other and a heightening of the separate and limited life of each by participation in the larger and fuller life of the University. At the same time, while the University is to be distinct from and greater than the colleges, it is to be made up of them; and the health and vigour of the whole will depend on the health and vigour of the parts. It is in the individual college also that the most intimate part of the collegiate life will be lived; in the college the corporate spirit must first develop so that loyalty to the college may expand into loyalty to the University. The college is, as heretofore, to be an organic whole, and, within its limits, complete; the new departure is this, that the college instead of being mechanically joined with other affiliated institutions to a university centre, which is organised without any closer relation to them than this affiliation, is now to be organically bound with other colleges into a higher and more complex unit, the teaching and residential University."<sup>1</sup>

33. Nevertheless, on obvious grounds of economy, the Committee were obliged to depart widely from these general proposals when they came to frame their detailed scheme. The entire teaching in Islamic studies, science, law, medicine, and engineering and the post-graduate teaching in arts was to be conducted by the University. The teaching for the B. A. degree, both pass and honours, except the pass teaching in English, was to be organised upon an inter-collegiate basis, that is virtually by the university as a whole. Thus only the intermediate teaching in arts was to be entrusted to the independent care of the colleges. Yet each college was, according to the plans, to be equipped with a large set of class-rooms, for use by degree students as well as by intermediate students. Corresponding in some measure to the distribution of teaching between the college and the university there was to be a university staff and distinct college staffs of teachers.

34. With the removal of the intermediate teaching from the purview of the University the case for making the colleges teaching units appears to us to disappear; and since this view was indepen-

<sup>1</sup> Dacca Report, page 20.

dently arrived at by Government in respect of post-intermediate teaching we need not perhaps argue the matter in any great detail. In a university of the size of Dacca the economy and convenience of making provision for the teaching by means of a single authority is apparent.<sup>1</sup>

35. It may be thought by some that the appointment of teachers by the governing bodies of the colleges is a valuable element in university organisation which our proposed amendment of the Dacca scheme would sweep away. We may point out, therefore, that this power of appointment was not, and we think rightly not, assigned by the Dacca University Committee to the governing bodies of the colleges. In a university of the size of Dacca, the most effective and economical way of instituting and making the teaching appointments is by means of a central organisation, and we have preserved that idea of the original scheme; though, as will be seen, we propose to substitute as the central organisation the University itself for Government except for a certain number of appointments.<sup>2</sup> The teaching unit should, in our view, be not the college, but the university department, and our substitution of the University for the college as the organising authority for the teaching, though it may seem a large amendment at the first blush, only extends to the whole university curriculum the pro-

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<sup>1</sup> Mr. E. E. Biss, of the Indian Educational Service, who has given so much time and attention to the Dacca scheme, strongly advocates the centralisation of all teaching above the intermediate standard, and of its being put directly under the control of the university authorities but he nevertheless advocates the retention of the title 'college' for the 'unit of university life.' Dr. Nares Chandra Sen Gupta, Vice-Principal of the Dacca Law College, although he does not, like Mr. Biss, contemplate separate treatment of the intermediate teaching, nevertheless advocates the disappearance of the college from the Dacca scheme on the grounds of economy. Rai Lalitmohan Chatterjee Bahadur, Principal of the Jagannath College, on the contrary urges that the individuality of the colleges teaching the bachelor courses should be preserved by each college specialising in certain subjects or departments of subjects and being specially staffed for the purpose as well as by other means. We think that it would be difficult in planning the University to decide on what principle such specialisation could be introduced at the outset. But we think that in course of time different halls may come to be informally identified, more or less, with special studies, in the same way as some Cambridge colleges are so identified and this would have advantages in the organisation of tutorial work. We should be sorry, however, to see this principle pushed to extremes. One of the advantages of the residential system is the contact of students pursuing different studies.

<sup>2</sup> Subsequently to the publication of the original scheme proposals were made for the inclusion of private missionary institutions in the University of Dacca. For a discussion of this matter, see below paras. 160-166.

posals made by our predecessors in regard to the major and higher part of it.

36. But while we think the University should be responsible for the organisation of formal university teaching, the college unit remains of the first importance in a residential university. Its functions have been well indicated in the following passage from the evidence of the Serampore Staff:—

“We desire....to express our belief in the main ideal embodied in the [Dacca] scheme, *viz.*, the residential system in collegiate and university life. But we consider that considerable care is necessary in the application of this system to Indian university conditions. Our aim should be not to duplicate Oxford and Cambridge conditions on the one hand, or Scotch, American and German conditions on the other. In the former case the tendency perhaps is for the residential college to regard itself too much in the light of an independent unit, and to think too little of the claims of the university as a whole. In the latter case the university is everything, and residential arrangements for students are a purely secondary concern. In our judgment, a combination of these systems is desirable for India. The individual college in India is not strong enough to stand so much alone as an Oxford or Cambridge college does. There is needed a concentration of academic resources such as we have in Edinburgh, and in most modern universities. On the other hand, experience has shown that Indian education greatly benefits by a wise and sympathetic application of the residential system to Indian conditions. All this is possible if the colleges take the form of academic hostels, or halls of residence providing tutorial help and supervision for their students.”

37. Our own views on the general conditions of student life as they exist in Bengal to-day, and the general changes which we propose with regard to hostel systems are set out in Chapters XIX and XXXIX, and we can only deal briefly with the matter here. We accept, with certain modifications, the general residential organisation proposed by the Dacca University Committee.

“We consider,” they wrote, “that all students not living with parents or duly authorised guardians should reside in college....No students’ messes or non-collegiate hostels should be permitted to exist in connexion with the new University; even the permission to live with an authorised guardian must be carefully regulated and controlled, since laxity in this respect may easily defeat the object of the residential system. A student should not be permitted to join a college and become a member of the University until the question of his residence has been settled. Residence except in his own home should be allowed only on special conditions: the student must be expressly confided to the care of the person with whom he is to reside; the latter having been interviewed by the college authorities and approved as a fit and suitable guardian must formally assume charge and responsibility. In admitting students preference should be given up to the limit of accommodation to those who intend to reside in college. Fears have been entertained that the expense of residing in hostels will be so great as to deter students of

average means from entering the University. If the proposals [of the Committee]...commend themselves to the Government, these fears will prove groundless and none but the very poorest will experience any difficulty owing to the expense of hostel life. For this class scholarships and free studentships should be provided, and private liberality called into play."<sup>1</sup>

38. The Dacca University Committee estimated that of the students in the four 'arts colleges'<sup>2</sup> for men, 1,500 would be 'in residence' and 560 would reside with their parents or approved guardians.<sup>3</sup> The question of poor Muslim students is one of especial importance in connexion with Dacca. The Dacca Committee estimated that of the 320 students to be attached to the 'Muhammadan College,' 100 would live with their families or approved guardians. Of these they say that—

"poor madrassah students are not infrequently housed and supported by charitable persons under the 'jagir' system, and consequently many will not be able to live in college. It will be the duty of the authorities of the 'Muhammadan College' to see that those who live, in jagirs or otherwise, outside the college are properly looked after by responsible persons."

39. The Committee obviously contemplated in the same way that the 'Jagannath College' would be attended by a relatively large number of poor students, and this view was put forward by Rai Lalitmohan Chatterjee Bahadur, the Principal of the College, in his evidence before us. The Committee estimated that 200 out of a total of 540 students of that college would be in residence; but they suggested that if possible the margin should be reduced by the provision of further hostel accommodation. They added:—

"We attach the utmost importance to the principle that as large a proportion of the students as possible should be in residence, since it is only on such students that the full benefits of university life can be conferred; in each college additional hostel accommodation should from time to time be provided to the fullest extent to which it can be utilised."

40. We adhere to the view expressed previously that residence with relatives and guardians is both natural and in many cases healthy,<sup>4</sup> and take up an intermediate position between that of

<sup>1</sup> Dacca Report, page 70.

<sup>2</sup> The Dacca College, New College, Jagannath College and Muhammadan College.

<sup>3</sup> The report of the Dacca Committee has been misunderstood on this point by a certain number of witnesses; thus Mr. Muraly Dhar Banerjee urges as an amendment to the Dacca scheme that 'residence should not be compulsory upon those who are able to live with their families and natural guardians;' and Rai Sri Nath Roy Bahadur makes the same plea.

<sup>4</sup> Chapter XIX, para. 7.

the Dacca University Committee and the position of Sir Gooroo Dass Banerjee, who while admitting that a residential university has advantages, and accepting the view that it should be tried at Dacca, over-states, we think, its drawbacks.

"A residential university", says Sir Gooroo Dass, "is more adapted for physical and intellectual education than a non-residential university by reason of its being able to provide better teachers and appliances and more regular supervision than what students can secure if left to themselves, and by reason of its relieving students from the trouble of looking after their board and lodging, and ensuring for them a certain measure of comfort. But it is less adapted for moral and religious education by reason of that very excess of help, assurance of comfort, and regularity of supervision, which are less helpful in training men for the rough world outside the college walls, where they have to be resourceful in emergency, to struggle patiently and cheerfully with adversity, and to accept the inevitable with calm resignation to a Will that is inscrutable and supreme. Living with parents or guardians, or in small messes under suitable occasional supervision, is far more elastic, gives students far better opportunities of mixing with human beings as human beings, and not merely as students, and is far more conducive to the growth of those moral and spiritual qualities so necessary for the world, than the rigid routine and dead level uniformity of life in a large hostel, where the largeness in the number of boarders must make discipline, to a great extent, more mechanical than personal. Moreover, differences of caste, creed, and colour may create unforeseen difficulties in this country. Then, again, judging from facts, it cannot be said that the graduates of the non-residential Scottish and German universities compare unfavourably with those of the residential universities of England. But I need not pursue the point any further for my present purpose, which is only to caution advocates of the residential system against being too sanguine, and against seeking to enforce it everywhere. Let us wait and watch how it works at Dacca."

41. We have described in Chapter XIX<sup>1</sup> what the 'elasticity' of living in small messes under occasional supervision means. We need not repeat our description. We have also pointed out that guardianship often involves the 'sweating' of a student who acts as a tutor; and it may be well to refer again here to the evidence of the Principal of the Jagannath College, Dacca<sup>2</sup> :—

"In Bengal college students live either with their parents or other natural guardians or in hostels where they are under more or less adequate superintendence and control or in 'messes' where they are left much more free, or as private tutors in the houses of people. These last usually get only their food for teaching one or more schoolboys and the guardianship exercised by the master of the house is only nominal. The conditions of residence in 'messes' and as private tutors are not healthy, morally or physically."

<sup>1</sup> Paras. 29-35.

<sup>2</sup> Rai Lalitmohan Chatterjee Bahadur, Question 17.

42. We are convinced that it is only in rare cases that students living with persons other than near relatives are able to do justice to their work; we hope that the 'jagir' system will be reduced to the narrowest limits and that provision will be made in the halls for all poor and deserving students (other than those living with near relatives), by a suitable system of stipends and scholarships. The examples of Scotland and Germany, where suitable and respectable lodgings for students are abundant, quoted by Sir Gooroo Dass, do not move us so much as the actual conditions of Bengal; we have already referred to the evidence of the Serampore College on this point. And if Sir Gooroo Dass idealises the 'mess' and many of the guardians, we think that he undervalues the hostel. We cannot accept his presentation of life at a hostel as being one of 'rigid routine and dead level uniformity.' That is far removed indeed from the happy and varied life as we know it in English colleges and university hostels, from the life that we have seen in residential colleges in India like Aligarh, Serampore, Bankura, or St. Paul's, Calcutta, in which the hostel is not a barrack surrounded by houses, but a real centre of social life, of college societies, of games, of that communal organisation on a small scale which, because it brings students into intimate contact with many of their fellows and equals, is in some ways both a fuller and a severer training for life than the family circle.

43. Nor can we accept the view that the hostel is necessarily less well suited for moral and religious training than any home. There are no doubt homes which provide a quiet moral and intellectual atmosphere, created by the loving care of parents and close relatives, which no hostel can rival. From such homes in Dacca we do not propose to take any student away. There are others from which students may wish to come, without any kind of compulsion, to the ordered life of the hostel. And we think that that life should not only be an ordered, but for those whose parents desire it, or who desire it for themselves, a religious life. We look forward to religious training being given in the hostels as an essential part of the communal life; and in the Muslim Hall there should be the daily prayers. But moral training must with all young people be largely a matter of example rather than of formal teaching or sermon.<sup>1</sup> It will be the aim of the University to place both the

<sup>1</sup> In regard to the question of definite religious instruction, see Chapter XIX, paras. 135-140.

hostels and the halls, into which we propose that the hostels should be grouped, under the headship of men of high moral character, who will exert on their pupils that kind guidance which cannot be mathematically defined, not because the ideas on which it rests are vague, but because they lie too deep for words; because such guidance implies a sense of rightness of conduct directed, as occasion arises, to the multiple and varied circumstances of students of different temperament, upbringing and natural inclinations. It would be more easy to point to such or such a man as the ideal head of a hall or a hostel than to prescribe the character which he must bring to his task, if he is to influence the little world under him effectively and fruitfully. In practice we know that such men *are to be found, and we trust that they will be found to guide the student communities of Dacca.*

44. We have spoken of the social, the moral and the religious sides of life in the university halls and hostels. These halls and hostels will also play an important intellectual part in the University, though a less formal one than the colleges contemplated by the Dacca Committee; and in two ways. In the first place, we think that, with possibly a few exceptions, each university teacher should *be attached to a hall (or hostel) and become responsible either for the general guidance of a number of students, or for their tutorial care in special subjects; and for teachers acting in the latter capacity, the students should write essays from time to time, so as to be trained in methods of individual work.* We regard such tutorial guidance as of the greatest importance.<sup>1</sup> But the hall as well as the class-room would be a centre of intellectual life in other ways also. In every hall there should be a library providing both books for pure recreation and others, supplementing the university library, and touching intellectual interests outside the formal curriculum. Again there should be societies not only for athletics and games but for the discussion of topics of learned and every-day interest. The teachers will get to know their students not only in the class-rooms but through their individual work, and through the games and societies in which they will take part. In a residential system the students and teachers form part of one community, working to one purpose, and helping each other to a common end.

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<sup>1</sup> Chapter. XXXIV, paras. 53-59:

45. We should be sorry indeed to see those students who live with their parents and guardians excluded from the privileges of this common work and activity. We recommend that every non-resident student should be attached to a hall or hostel and enjoy as far as possible all the rights of the resident students in respect of tutorial assistance, library, games and societies.

46. Cardinal Newman has eulogised the residential system in a well known passage.<sup>1</sup>

"I protest to you, Gentlemen," he said, "that if I had to choose between a so-called university, which dispensed with residence and tutorial superintendence, and gave its degrees to any person who passed an examination in a wide range of subjects, and a university which had no professors or examinations at all, but merely brought a number of young men together for three or four years, and then sent them away as the University of Oxford is said to have done some sixty years since, if I were asked which of these two methods was the better discipline of the intellect ... which of the two courses was the more successful in training, moulding, enlarging the mind, which sent out men the more fitted for their secular duties, which produced better public men, men of the world, men whose names would descend to posterity, I have no hesitation in giving the preference to that University which did nothing, over that which exacted of its members an acquaintance with every science under the sun."

We do not go so far. Newman is thinking of the élite, rather than of the average who form the majority of students; and his conclusion seems to postulate the existence of an intellectual tradition which has been largely created in the older British universities by the systematic training to which he assigns so subordinate a position. On such training we lay no less stress than on the residential side.

47. We are convinced that formal lectures and teaching must have a place, and an important place, in university education. The lecture can, though it does not often do so in Bengal, give a perspective and a sense of the relative value and importance of the different sections of a subject which come only from long study, and which cannot be derived by a young student from the pages of a printed book. It is uneconomical to give this general kind of survey to only a few students at a time, and, again, there is, for the lecturer himself, a stimulus created by a large audience of a different kind from the stimulus derived from discussion with

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<sup>1</sup> Newman's *Idea of a University*.

a small group of students in the study.<sup>1</sup> We regard both elements as desirable for the ideal University. The residential and tutorial element glowingly eulogised by Newman, and the lectures on a large scale which have exerted so profound an influence on students in universities like the University of Paris, the Scottish universities and the modern universities of England and Wales, ought both to find their place in Dacca.

48. The Governments of India and of Bengal, and the Dacca University Committee desired to see established at Dacca a university of the 'teaching and residential type' open to all, but with special facilities for the encouragement of Muslim students and of Muslim studies. While our ideals of the training to be given to students by the University of Dacca coincide, as far as we can ascertain, with those of the Dacca University Committee, we find ourselves somewhat widely-in disagreement with the Committee in respect of the university constitution required to carry those ideals into practice.

49. There is in India some looseness in the use of the word 'governing body', which, we think, leads to practical misapprehension. The 'governing body' of a Government college does not in any real sense govern the college; it can neither appoint nor dismiss the staff, nor has it much control over the budget; its functions are less important than those of many 'managing committees;' and though the Dacca University Committee proposed two 'governing bodies' (the Convocation and the Council) for the detailed administration of the University of Dacca, a large and important part of that detailed administration was to be exercised directly by Government, as will be seen from the following excerpts from the report of the Committee<sup>2</sup> :—

*Relations of the University with the Government and the Director of Public Instruction.*

"We consider that the control of the Government over the University should be exercised directly, and that in order that the Government may be kept informed as to its progress and management, the Director of Public Instruction should be appointed Official Visitor, with full powers to inspect all colleges and departments. The University should correspond with the Government on all questions excepting those relating to staff in which case

<sup>1</sup> Dacca Report, page 36.

<sup>2</sup> *Ibid.*, pages 142-144.

correspondence should, for the sake of convenience and despatch, be conducted through the Director.

We recommend that the Government should confer on the Vice-Chancellor the powers with regard to leave which are delegated to the Director of Public Instruction by the Bengal rules and orders. These powers include the grant of privilege leave to all officers, and the grant of leave of all kinds to officers in Classes VII and VIII of the Provincial Educational Service, to officers of the Subordinate Educational Service, and to ungraded officers whose pay does not exceed Rs. 250 a month. We also recommend that all other powers with regard to staff which have been delegated to the Director of Public Instruction, including the authority to appoint officers of the classes enumerated above, should be exercised in the University by the Council. This general recommendation cannot extend to cases, such as promotions in the Subordinate Educational Service, which must necessarily be dealt with by the head of the department. The Council should have the same authority as is vested in the Director of Public Instruction, subject to budget provision, to make minor additions to the staff: this includes the appointment of teachers, clerks and menials, outside the grades of the educational services, on pay not exceeding Rs. 45 a month, subject to the submission of quarterly statements. The Council should be consulted before an officer serving under the University is transferred elsewhere; similarly if the Council wishes to obtain the services of an officer from outside the university, or the removal of a member of the university staff, it should make an application to the Director of Public Instruction, who will, if necessary, refer the case to the Government.

In order that the Government may be kept informed of the conduct and merit of officers serving under the University, the present system of annual reports should be maintained. These reports should be submitted by principals of colleges through the Vice-Chancellor, or, in the case of officers serving immediately under the University, by the Vice-Chancellor direct, to the Director of Public Instruction.

Colleges should not correspond directly with the Government or the Director of Public Instruction; any college requiring additions to staff, buildings, etc., or desiring to raise any question which will require Government orders, should submit the case to the Council.

#### *Financial arrangements.*

... The scheme is based on two main principles: the first that all receipts should be credited to the Government and that the Government should bear all charges; the second that, as far as possible, accounts work should be centralised.

The University will be maintained by the Government, the members of its staff will be Government officers, and its fees and other receipts will meet only a portion of its annual cost. In these circumstances the simplest and most convenient course will be, that all receipts from fees, fines and miscellaneous sources should be credited to the Government, that salaries and establishment charges should be paid direct from the treasury, and that the Government should make an annual grant to cover all other expenditure. The annual grant should be paid into a university fund so that the unspent balance will not lapse at the end of the year. Subject to the general control of the Government, the University should have full authority to deal with this

fund and to apportion it among the various colleges and departments. Before the commencement of each year, and as soon as the amount of the Government grant is known, the Finance Committee will prepare a budget estimate of expenditure and submit it to the Council. After approval, the estimates will serve as authority to colleges and departments to incur expenditure under the ordinary heads of contingency ; but all items of a special or unusual nature, or which exceed a certain fixed amount, should be submitted to the Council for previous sanction. This system represents a very wide extension of that which obtains in the Presidency College, an extension which is justifiable in view of the magnitude and importance of the new institution and of the character of its administration. The Government may eventually be willing to grant a larger measure of financial autonomy to the new University, but at first the measure of decentralisation which we suggest would appear to be sufficient, while it will be of great advantage to the University to work under a simple financial system during the early years of its organisation."

50. The University was thus not to be responsible either for its own staff, or for its own finance, nor was it to be responsible for its own regulations. Exactly as at Calcutta at present, the most minute change in regulations, after passing through the cog-wheels of an elaborate machinery, was to be submitted to Government for confirmation. The whole of the complex machinery devised for working the University was in the main an advisory machinery. We have shown in another place<sup>1</sup> the grave disadvantages of the existing dissociation between detailed knowledge of academic matters and responsibility for their administration, and have suggested that while the State cannot and ought not to rid itself of the ultimate responsibility for the larger questions of university policy which affect the country as a whole, the attempt of the State to manage a university in detail leads to confusion ; it weakens the sense of responsibility of the University in advising Government as to the changes in their regulations, since Government is not bound to take their advice ; and the responsibility of Government in dealing with university administration becomes somewhat unreal, since it is an obvious impossibility for the Government department concerned to be acquainted with the details of university management in regard to which they are legally obliged to make decisions.<sup>1</sup>

51. We are well aware of the difficulties of the situation which the system of the Dacca University Committee was intended to meet ; and we think those difficulties should be stated with the utmost frankness, in respect of the three questions of staff, finance and regulations.

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<sup>1</sup> Chapter XXVIII, paras. 74 to 91.

52. *Staff*.—The Indian service system (leaving aside the difficult question of whether it is ultimately an economical system or not) has advantages which cannot be denied and ought not to be understated. It attracts many men (1) because of the prestige of Government service, (2) because of the security of Government service, (3) because of its system of pension and leave.

Its disadvantages from the university point of view may be summed up as follows:—

- (1) The University cannot choose its own staff to suit the special conditions of its teaching; even supposing the Government to accept its advice, its choice will be far more limited in many cases than if it could go outside the cadres; and it may have forced on it a man who deserves promotion and for whom promotion can only be found in a university post for which he is not the person most fitted.
- (2) In just the same way as Government from a sense of equity to the members of one of its services may feel itself obliged to promote a person in the service to a post in the University for which he is not particularly suited, so it may feel itself constrained to take away from the University a person who is doing excellent work therein and give him promotion in some outside administrative post; the University cannot resist the appointment in the first case; nor can it resist the transfer in the second, or offer the teacher additional salary to retain his services, for the Government acts above the head of the University.
- (3) Hence members of the services must feel in the majority of cases that their future lies not in university advancement, but in service advancement; some will no doubt be sufficiently devoted to the work of their chairs to decline the proffered advancement; but in other cases, and especially in the case of men with families to support, this abnegation cannot be expected. It may be said, and fairly said, that a certain number of men develop towards maturity a taste for administrative work in which they have gained some experience as teachers; but in the first place these cases are excep-

tional, and secondly there should be administrative posts inside as well as outside the University to satisfy the ambitions of teachers of this type. What is unsatisfactory is the perpetual temptation to a teacher to take an administrative post as a means of promotion from a teaching post. Such a temptation is bound to exert a disorganising effect on any teaching staff.

- (4) The attractions of the service system are not so great as they may appear at first sight; a service system fails to attract precisely that class of man who in the great majority of cases is appointed to a university chair in the West, namely the man of more mature age, who has already made his reputation as a teacher and a scholar or a man of science. Apart from the difficulty of inducing a man of such age to go to a distant country, it fails to attract him because appointment and promotion in the service are and must ordinarily be from the bottom; and because the pension conditions are far less advantageous to a man between thirty and forty or over forty than they are to a man between twenty and thirty. The Dacca University Committee felt these difficulties and to meet them proposed to create four 'special chairs' for men of about 40 with a distinguished reputation, to whom salaries of from Rs. 1,800 to Rs. 2,000 a month would be offered. The creation of such chairs outside the ordinary cadre implies the break-down of the service system on the one hand; and on the other brings into a clear light the disadvantage from which Dacca would suffer in not being able to go into the open market and get the best man available for any chairs but these four.

53. We feel that any university tied to a service system on the existing Indian pattern would be seriously handicapped; and that the University of Dacca would suffer gravely if it is adopted.

54. We may quote at this point the evidence of a member of the Indian Educational Service, Mr. G. H. Langley, Professor of Philosophy in the Dacca College:—

"The existing defect of internal organisation," he writes, "is largely the result of the fact that professors of colleges are members of the Government services, and are not appointed to special positions in particular colleges. The

consequence of this is that it is not always possible to get the best available man for any post that may be vacant ; and, further, the relation between lecturers in any college is the conventional relation between certain wide Government services, and not the natural relation necessary for the most efficient organisation of the studies. I am, therefore, convinced that provided satisfactory safeguards can be given for the security of positions (such safeguards being necessary to secure the best type of professor) it will be better to dissociate professors from their immediate service to Government and to make them servants of the University, appointed to definite posts. Apart from this it is doubtful whether that freedom and autonomy of the body of teachers, which is so essential to the life of the University, can be attained."

55. We now come to the question of safeguards ; we think that they should be as great for specific university posts as those now existing in Government service. We have sketched elsewhere the conditions of tenure which we regard as suitable.<sup>1</sup> We think that, as in Government service, there will be posts for which a period of probation will be necessary, but that after the lapse of that period the appointment should be renewed (except for short period appointments dealt with in paragraph 56 below) until the age of retirement, under a legal contract which the University could not break, subject of course to its annulment owing to gross personal misconduct or mental or physical incapacity, of which cases an independent tribunal should be judge. No member of the staff under these conditions could either be summarily dismissed by the University or have resignation forced on him unjustly. Legal contracts between a teacher and the body employing him, though common in Great Britain, are so rare in India that in unexpected quarters we have found ignorance of their value. We think that the contract on its financial side might be guaranteed by Government. In asking for such a guarantee we are only asking for what is given by Government under the service system proposed by the Dacca Committee ; and under the general system which we shall recommend they would be amply covered by their general control of university funds. We are inclined to think that no person could regard the security of a university post held under such conditions as less than the security of a post held under the service system.

56. We have referred incidentally to ' short period appointments.' We think that it might well be to the advantage of the University in certain cases to offer appointments say of ten years, with a considerable bonus payable at the expiry of that period, to secure the

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<sup>1</sup> Chapter XXXIV, paras. 112-120.

service of persons who would be unwilling to accept life appointments. It would be for the University to decide in what cases such appointments would be desirable from the university point of view, attractive from that of the candidate. But we can conceive the case of a man willing to come to Dacca for a term of years, but unwilling to take up his domicile there for the whole of his working life. Such appointments would of course be as strictly guarded from the legal point of view as life appointments.

57. We have proposed elsewhere to substitute for the pension system a superannuation system, extensible, if possible, to all Indian universities, which would enable any university teacher to accept transference from any one Indian university to another without loss of superannuation benefits. Such a system, if the contribution from the University is made sufficient, can be made as attractive as, or even more attractive than, a pension system; because the participant can withdraw from it by resignation at an age less than the age of retirement without losing his benefit.

58. From the point of view both of teachers and of the University, we think, therefore, that the system of appointment to specific posts which we propose is more advantageous than the service system. But we are aware that the abandonment of that system may raise some misgivings in the minds of the Muslim community. The community feel that if Dacca is to exercise the attraction for Muslim students which it is intended to exercise the Muslim and European teachers must not be altogether outnumbered, as they are both in Calcutta and in the existing Dacca colleges, by the Hindu teachers; and some influential Musalmans, at any rate, are inclined to think that it is only by the direct intervention of Government that such a proportion can be secured. We have dealt with the general question raised here in Chapter VI.<sup>1</sup>

In designing the constitution of the University of Dacca, we have had Muslim needs constantly in our mind, though not, we believe, to the neglect in any way of the interests of the general community as a whole; and we believe that committees of selection such as are described in Chapter XXXIV,<sup>2</sup> could be trusted as a rule to bear in mind the necessity of appointing an adequate number of Musalmans to the teaching staff; we propose for the constitu-

<sup>1</sup> Para. 17.

<sup>2</sup> Paras. 112-120.

tion of these committees a constitution similar to that proposed for the University of Calcutta ; but should the general opinion demand it we should be willing that the final appointment should be left to the Chancellor of the University, so as to leave open the possibility of representations if either the Muslim or Hindu community were likely to suffer owing to a disproportionately small number of appointments of members of that community.

59. Further, we are clearly of opinion that it is essential if the new University is to be started on right lines that it should have the assistance of a number of capable teachers recruited in Europe. It is quite true that a committee of selection constituted in the way described will not be debarred from choosing its candidates from Europe or America. But this process would always take time ; and we think that it should be laid down that a certain number of posts should be filled by the Secretary of State acting on the advice of a specialist committee in England to whom the University would furnish the necessary particulars. We recommend that the procedure adopted should be similar to that which we shall recommend for corresponding appointments in the Presidency College.<sup>1</sup>

60. *Finance*.—We come next to the question of finance. Under the original scheme of the Committee, of which the main features are set out above, all receipts were to be credited to Government ; and Government was to pay salaries and establishment charges direct from the treasury and to make an annual grant to cover all other expenditure. The Dacca University Committee incidentally recommended that the University should have authority to accept endowments and to make arrangements for the administration of trusts ; but made no provision for the separate treatment of income from such sources. The University was to be run on the lines of a Government department, with, however, one special and important proviso that the unspent balance from any year was to be carried on to the following year, a condition which cannot easily be adjusted with the present system of finance by annual budgets.

61. In a later scheme the contingency of gifts to the University was provided for, and it was suggested that there should be two budgets, (1) a Vice-Chancellor's budget including all Government

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<sup>1</sup> Chapter XXXIV, para. 169 ; see also para. 88 below.

grants and (2) a budget of the university fund (or Council's Budget) which included certain sums transferred from the Vice-Chancellor's budget, together with all the income accruing to the university from non-Government sources. Over the income accruing to the university from non-Government sources the Council were to exercise control subject to general Government supervision. The Vice-Chancellor's budget was to be subject to the approval of the local Government.

62. To the system of finance proposed by the Dacca University Committee we feel grave objections. The Committee were, we think, justified in not anticipating any special provision for benefactions to the university under the system proposed, for the history of university education in Bengal shows that it would be unlikely to receive any, except possibly for scholarships and prizes. It is true that, as we have pointed out in Chapter III, benefactions of greater or smaller extent have been received by the Government colleges at Rajshahi, Chittagong and Krishnagar. But we understand that in these cases the gifts were made either for the foundation of the college, or to induce the Government to raise it from a second-grade to a first-grade college, or to induce Government not to disestablish it. On the other hand, although the Hindu College, from which the Presidency College sprang, was created by means of liberal gifts from private donors, the Presidency College itself since its existence as a Government institution in 1855 has not, so far as we are aware, received any benefactions except for prizes or scholarships. Dacca College, established in 1841, is in a similar position, and Sibpur Engineering College also. On the other hand Calcutta University, since its teaching functions have become a reality, has received really handsome endowments for teaching amounting to 25 lakhs in all. We think it probable from past history in Bengal that if the organisation is such that the local Government has to approve and take the responsibility for the annual budget in the way proposed, it will be naturally regarded as the sole source of university funds and the 'governing bodies' of the University will neither feel it their business to appeal to the community at large, nor would there be much likelihood of their doing so with success.

63. Apart from the question of benefactions we do not think the system proposed would conduce to the most efficient and economical

working of a large and complex institution like a university ; it implies the separate consideration by Government of every item of new expenditure ; and each department of study making claims for its development will naturally tend to press those claims to the utmost, irrespective of the claims of other departments. The local Government will scarcely be in a position to adjust those claims ; yet, if it says to the university central authority ' these claims are for you to adjust, we can afford only so much,' the system, *de facto*, though with infinite complexities of detail, is reduced in principle to the block-grant system ; and we suggest that the block-grant system should be adopted from the outset. Under this system the Government would make a block-grant to the University for a number of years, three or five, after which it would be reconsidered ; and unless some special need were to arise, it would be the business of the University to live within its means within the period prescribed. It is to be pointed out that the block-grant system is an elastic system under which Government can tighten or relax its control as may seem necessary by ear-marking or releasing from ear-mark such portion of its grants as it sees fit. But both the University and the Government are freed from the necessity of reconsidering each detail annually ; and the inducement to the University to employ its resources with due economy, to meet the healthily increasing claims on it, will be far greater than if it is able every year to press each detail of those claims on Government. We think that, without the application of any rigid formula, increased support from Government might be made (following English precedents) to depend to some extent on local support.

64. There must of course be ample financial safeguards. Copies of the annual estimates of income and expenditure should be furnished to Government for their information, and the accounts should be audited by Government as a guarantee that the money has been spent for the purposes for which it has been granted. We think there is much to be said for the system of ' continuous audit.' Further, we propose a periodical inspection of the university under the direction of the Visitor.<sup>1</sup> Under such a system we do not think irregularities of finance or administration could occur ; or if they did, they would promptly be brought to light.

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<sup>1</sup> Chapter L, para. 45.

65. The word 'autonomy' has been used by some important witnesses whom we shall quote below. We believe that others take alarm at the notion of autonomy.<sup>1</sup> By autonomy, where we ourselves use the word, we certainly mean neither irresponsibility nor freedom from all constitutional restraints. But without a certain degree of freedom there cannot be any responsibility; and without such a degree of freedom we do not think the University of Dacca can ever become a living and healthy organisation.

Mr. F. C. Turner, formerly a professor in, and now Principal of, Dacca College, writes:—

"I consider that the University should be entirely autonomous, save only in the matter of the pay of such officers of the University and colleges as are Government servants. The Director of Public Instruction should have a seat on the convocation and council of the University, but neither he nor Government should exercise direct control over the policy of the University. The University and each college which is financed by Government should receive a consolidated grant, together with tuition, examination, and other fees (which should be exempted from the rule under which such money is paid into the general revenues), subject to audit by the Accountant General, but should be at liberty, within that grant, to appropriate funds to any educational object under their control. Schemes for the expansion of the University or colleges involving additional expenditure should be submitted to Government through the Director of Public Instruction."

"I think," writes Dr. Nares Chandra Sen Gupta, Vice-Principal of the Law Department at Dacca College—

"that the fundamental idea underlying the Dacca University Committee's report on the constitution of the University is faulty. I do not think it is possible to run a university as a mere department of a centralised Government. It would, no doubt, form a component unit of the Government organisation in so far as it discharges an important public function, but I take it to be of the essence of university life that it should have complete autonomy."

Mr. T. T. Williams, Professor of Political Economy at Dacca College, says:—

"Considering the constitution of the University, I believe that it should be an autonomous university. As far as possible it should have complete authority as regards finance, the Government paying a fixed annual sum (a consolidated grant) and the remaining revenue needed being obtained from fees and other ordinary university receipts. I suggest also that the open land in Amlapara should be built upon and the proceeds of leases given to the University. The university should be the final authority for all expenditure, within the terms of its charter. Carefully prepared budgets and accounts

<sup>1</sup> See evidence of Nawab Syed Nawabaly Chaudhury, General Memoranda, page 206 and Question 4. The scheme which we propose contains, we believe, provision for the complete safe-guarding of communal rights by public authority.

ought to be published in readily available form. This financial control and responsibility will induce real economy in education and, I believe, it will induce private donors to assist in founding chairs, scholarships, etc., and in the erection of buildings."

The Rev. T. E. Teignmouth Shore of the Oxford Mission in Dacca, speaking of the original Dacca scheme, writes:—

"The whole scheme seemed to me to be far too rigid and complete in detail. What is needed is something which will be, in its initial stages, extremely plastic. The University should be called into existence with a minimum of machinery and left as free a hand as possible in the moulding of its own corporate life. In this it is essential that it should be freed from Government control as far as possible. Visitorial powers vested in Government would be sufficient to prevent any serious misuse of its authority by the University and this is all that is really needed. Members of the Government educational services working in the University and its constituent colleges should, for the time being, be responsible to the university authority alone."

66. *Statutes, Regulations and Ordinances.*—We now come to the question of regulations. We have elsewhere discussed more fully the view that it is inadvisable for the University to be obliged to submit every detail of its regulations for Government approval.<sup>1</sup> On the other hand it is clear that certain wide changes in them may affect matters of public importance, including the relations of the University with other universities and especially the University of Calcutta. As in the case of the University of Calcutta, we propose to draw a distinction between the various kinds of rules necessary for the governance of a university, in the order of their importance, and to classify them as Statutes, Ordinances and Regulations.

(a) *Statutes* should be rules dealing with the more fundamental matters, and in accordance with the precedent adopted in modern English universities, should be only subject to change with the consent of public authority. In the case of most of the modern English universities that authority is the Privy Council; for the universities in Bengal we propose the local Government.

The first statutes should form a schedule to the University of Dacca Act. But the Act itself should include a clause permitting the statutes to be added to or amended by

<sup>1</sup> Chapter XXVIII; see also Chapter XXXVII, Section II. The Dacca University Committee recommended that the 'regulations' under their scheme should not enter into details of curricula, etc., which could properly be settled by an order of the Council (Report, page 144).



ordinance by means of *regulations* bearing upon such details.<sup>1</sup>

Thus an ordinance might in matters relating to courses give the Academic Council the right to prescribe regulations relating to attendance, and to the relevant faculty or Board of Studies regulations relating to particular set-books; or it might confer the right to prescribe the whole of such regulations either on the Academic Council or on the relevant Faculty. We purposely refrain from laying down in any hard and fast way which matters should be prescribed by ordinance and which by regulation.

The scheme which we propose is an elastic one enabling delegation to be from time to time either widened or restricted as may seem desirable to the relevant authorities in regard to any particular matter. While neither the Government nor the Court would be able to interfere unduly or in detail with the every-day working of the University the ultimate control in regard to statutes would lie with the Government, in regard to ordinances, with the Court. The 'autonomy' of the University and of the academic bodies within the University would therefore be limited in this way, as well as, in the case of ordinances, by the veto of the Chancellor.

67. Before giving a sketch of the University of Dacca, as we conceive it, there are two more questions involving general policy which we must discuss; its freedom from racial or religious tests, and the size of the University.

68. *The University to be open to all.*—We think it desirable that the intention of Government that the University should be open to all ought to be made explicit in its constitution. The Benares Hindu University Act, 1915, Section 4 (1) provides that—

"the University shall, subject to the regulations, be open to persons of all classes, castes and creeds, but provision shall be made for religious instruction and examination in Hindu religion only."

And we understand that a recent draft of the Muslim University Bill contains the following section:—

"The University shall be open to all, and no religious test shall be imposed upon any person in order to entitle him to be admitted as a professor, lecturer,

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<sup>1</sup> The Dacca University Committee (Report, page 134), recommended that the Council should make such changes in courses and methods of instruction as were not fixed by regulations.

teacher or student of the University except for professors and lecturers of theology. The study and examination in theology shall be compulsory to Muslim students only."

We think that some such provision as the following should be made in the Dacca University Act:—

It shall not be lawful for the University or for any of its authorities as hereinafter provided to adopt or impose on any persons any test whatever of race, or of religious belief or profession in order to entitle him to be admitted as a professor, teacher, or student of the University or to hold any office therein or to graduate thereat, or to enjoy or exercise any privilege thereof, except where such test is specifically provided under this Act or the statutes of the University made thereunder, or as may be defined in Trust Deeds laying down the conditions for benefactions accepted by the University. Provided that nothing in this Act shall prevent religious instruction being given to those willing to receive it in the University and its halls and other institutions forming part of the University or connected therewith by persons (whether teachers of the University or not) chosen by the competent authority named in any ordinance on this subject.

We are of opinion that the only benefactions in which there should be limitations of any kind to particular communities are benefactions for scholarships or bursaries, etc., or the provision of religious teaching, and that the University should discourage benefactions with racial or religious limitations of any other character.

69. *Size of the University.*—The size of a university is an essential factor in its organisation. We have seen that the University of Calcutta has at present overgrown its organisation and become unwieldy and that this is one of the main reasons of its existing defects. It may seem premature before the University of Dacca is founded to foresee for it a similar fate; but university education has grown so rapidly in Bengal that it is well to take precautions. We hope that the ambitions of Dacca will not be to be made 'bigger than the biggest.'

The University will probably have to provide soon after its foundation for from 1,500 to 2,000 students, all above the intermediate grade; if this anticipation in respect of the number of its students is realised it will be larger than the University of Manchester or the University of Leeds.<sup>1</sup> This is not the place to

<sup>1</sup> The Dacca University Committee contemplated about 2,000 students; by allowing for the removal of the intermediate classes, and by adding an extra year for the B. A. course, the number will probably be reduced to 1,500. We arrive at the same number of 1,500 if starting from the basis of the present number of the students in the Dacca colleges we assume that the bulk of the students from the Dacca district and about one-third of the students from the neighbouring districts of Mymensingh, Faridpore, Bakarganj and Comilla will join the Dacca University.

suggest an ultimate limit for the number of undergraduate students; but we think it would be wise for the University and the governing bodies of the University to fix such a limit if the number shows any signs of increasing unduly. Such an increase, without reorganisation of the University on a different scale, would mean a diminution of the attention which the teachers could pay both to their students and to their studies; for an undue proportion of the time and energies of the best teachers would be devoted to attending meetings and to the multiple details of a large administration; the best ideals of the institution and of the students would be sacrificed; and Dacca would tend to become a machine instead of a university. But we wish to make two points quite clear; first that we do not suggest any limitation of post-graduate or research work at Dacca, or any measure that would prevent its taking the highest rank among universities in India or elsewhere, if it can find the teachers and the students of the right quality; secondly, that we do not propose the imposition of any limitation on the opportunities for general university training in Bengal. If the contingency which we contemplate arises at Dacca it can be met in various ways; for instance, the University might be re-organised, with a far more complex official machinery, designed to relieve the teachers from administrative functions that would otherwise fall to them; or—and this, we think, both in the interests of Dacca and of Bengal, generally, the better solution—a second university would have to be created in the mufassal, say at Rajshahi or Rangpur, on the general lines of Dacca, but modified in the light of the Dacca experience and to meet the demands of local conditions.<sup>1</sup>

70. *Sketch of the University.*—We think that before entering into details of the teaching and residential organisation and of the constitution which we propose for the University it will be useful to give a brief sketch of the University as we conceive it.

71. The residential side of the University will be provided for by larger units which we call 'halls' and smaller units, which we call hostels; the teaching side will be provided for by university departments, of which the majority of the teachers will be appointed by the University. The whole organisation will be

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<sup>1</sup> Chapter XXXV, para. 20 and *passim*.

self-contained and simple, and, except for the management of the private hostels,<sup>1</sup> unified.

72. We propose that the management of the teaching, and certainly of all details both of university teaching and curricula, should be entrusted to the teachers, who will have as their most important organ a body called the Academic Council. In addition to the Academic Council, there will be from the first Faculties of Arts, Science, and Law; other Faculties, Medicine and Agriculture, and possibly Civil Engineering will, we hope, be added later. The Faculties will appoint for the consideration of special subjects, and of groups of subjects taken by students intending to follow a particular course, committees called Boards of Studies. The teachers of a particular subject will form a Department of Studies, presided over by a responsible head.

73. As the supreme body for fundamental legislation there will be a large assembly, called the Court, which will serve to bring the University into relation with the general community. We hope that many of those members of the Court who do not belong to the academic body, as well as the teachers, will assist the University by serving on the committees which it will be necessary to create from time to time either for the purpose of raising funds or to give advice in regard to technical matters and new departures. To deal with executive and financial matters there will be a small but strong body, on which the teachers will have ample representation, called the Executive Council.

74. We do not forget that the creation of the University was largely due to the demand of the Muslim community of Eastern Bengal for greater facilities for higher education; and we have assigned to the representatives of that community an important place on all the administrative bodies. We hope that on the teaching side able members of the community, not only from Bengal but from other provinces in India, will come forward to fill a suitable proportion of the new teaching posts. The Muslim share in the University cannot be created by regulation alone; it will depend largely on the effective contribution which the community is willing and able to make to the teaching efficiency and strength of the University as well as to its student population. The

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<sup>1</sup> See paras. 160-166.

University will need the fullest co-operation of both the Hindu and the Muslim communities to ensure its success.

75. The freedom from the burden of intermediate teaching will, in our judgment, immensely ease the initiation and progress of the University. We propose, for reasons given by the Dacca University Committee with which we fully sympathise, that the courses for pass and honours students shall be differentiated on lines not hitherto adopted in Bengal. The honours course should make a greater demand on the individual student and involve not more, but less, systematic teaching than the pass course. We propose that in Dacca, as in Calcutta, the honours course should be at once increased from two to three years; and we recommend that the two universities acting in concert should at the earliest possible date increase the pass course for the bachelor's degree also to three years at a later date. A university student should, as a rule, remain at the University for not less than three years before proceeding to a degree.

76. We think that the minimum length of the M.A. and M.Sc. courses should ordinarily be two years, but that with the permission of the Faculty concerned and of the Academic Council this course might be reduced to one calendar year, after special application, in the case of honours students. We do not think such a reduction would be justified, even in special cases, for pass students. Students who have taken the B.A. honours course should be permitted to present as a substitute for part of the written examination a piece of individual work on the part of the candidate which might take the form either of original investigation, or of an ordered and critical exposition of existing data with regard to a particular subject approved beforehand by the University. The regulations for the M.Sc. should be on the same lines as those for the M.A., but in most cases even a student who has taken his honours B. Sc. brilliantly will not be in a position to carry out a piece of individual investigation for the M.Sc. in one year; he will need to continue his technical training; and we think that the reduction of the period of study to one year should probably be made in fewer instances for the M.Sc. than for the M.A.

77. In the Arts Faculty a marked feature would be the department of Islamic studies, side by side with which we hope to see later a co-ordinate department of Sanskritic studies. There is ample room in the University for the two. The department of

English must necessarily be a strong one. As indicated elsewhere we think that it should provide teaching in the use of the English language for all students ; meaning by this a training in the power of understanding and expression which should aim at enabling each one to master any book in English of which he has need, and to express himself in English clearly, systematically and effectively. We think that English teaching with this end in view should be provided for all students—science students as well as arts students—who need it, independently of the question whether English forms part of their examination curriculum or not. We hope that there will be a strong honours school in English literature. But for all pass students we think the literary side of English should be restricted to the modern period.<sup>1</sup>

78. The Dacca University Committee suggested that the only vernacular languages for which provision need at first be made are Bengali and Urdu. To these we would add Assamese. As university subjects, the vernaculars should be studied scientifically, from the philological and linguistic, as well as from the literary, point of view, but we do not think that this study should be compulsory for all students. The question of training in the use of the vernacular is discussed in Chapters XVI, XLI and XLII.

We hope that both Bengali and Urdu will be studied scientifically as well as colloquially and in connexion with the classical languages with which they are related. The classical Oriental languages, Sanskrit, Pali, Arabic and Persian, will find an important place in the Arts curriculum ; and we think that for Muslim students Urdu should be treated in the curriculum as an alternative to one of the languages generally included in the classical group, when Urdu is not their vernacular. We have discussed this question at length elsewhere.<sup>2</sup>

79. We agree fully with the suggestions of our predecessors that provision should be made for the teaching of French and German so as to enable students to read books in those languages relating to their studies.

80. We hope that in the department of history, which ought mainly to deal with Indian history, Islamic history and general

<sup>1</sup> We deal with this matter more fully in Chapters XVIII, XXXIV, paras. 44—47, and XLI.

<sup>2</sup> See especially Chapters VI, para. 27, XXXI, para. 70, and XXXII, para. 27.

modern European history, there will not be an excessive attempt to cover the whole field until it is possible adequately to increase the staff for this purpose. In economics we hope that in addition to the general work some attempt will be made to deal with the local problems of economics and of sociology, for which material lies at hand ; and possibly some social work among the poorer classes may be undertaken not only by the students in the department of economics but also by those in other departments. The Baptist Hostel has already started work of this kind. The department of philosophy will be strengthened by the co-existence of the departments of Islamic and Sanskritic studies.

81. Among the subjects which belong to the Faculties of both Arts and Science, mathematics will no doubt attract the largest number of students and should have a strong department. We should like to see a department and a readership, if not a professorship, of geography established at an early date. It is a subject indispensable for the teaching of history and of economics, and an essential element in the training of teachers. For reasons which we have given below we have suggested that the department of teaching should be expanded into a department of education. In such a department geography should play a considerable part.

82. We are entirely in accord with the view that to place Dacca on a proper basis the Faculty of Science should be strengthened by the addition of biological sciences, botany, zoology and physiology, which have received too little encouragement hitherto in Bengal. They are essential in a properly equipped university ; and if and when a medical faculty is established they will be indispensable for the professional studies. We hope that a department of geology will be established at a later date. The departments of physics and chemistry are cramped in their accommodation. A new physics laboratory is essential to allow of proper expansion for both subjects.

83. There is a large and flourishing school of law at Dacca. We recommend that it should be made into a faculty. We also recommend that as soon as practicable there should be constituted a faculty of medicine, and later, a faculty of agriculture, and possibly one of civil engineering.

84. The Dacca University Committee suggested that the students of the proposed College for ' well-to-do ' classes should not necessarily

be required to take degrees. As we shall explain below, we are unable to concur in the general proposals of the Dacca Committee in this matter. But we regard it as fully within the scope of a teaching university to offer (as do the modern British universities) courses which are not degree courses, and to accept students, under defined conditions, who are not candidates for a university degree, though such courses should imply, like the degree courses, steady and continuous work. If and when the University is in a position to offer classes in zamindari management, such as were suggested by the Dacca University Committee, they should be open to all students qualified in the judgment of the authorities to take them. We think that the university courses should be open not only to regular students but under strictly defined conditions to all residents in Dacca qualified to follow them and willing to pay the prescribed fees, which should perhaps be on a higher scale for occasional than for regular students. In such subjects, for example, as history or economics, there might well be special courses which could profitably be attended by residents in Dacca of mature age who desired to pursue their studies in this direction.

85. We hope that in every branch in which teaching is carried on there will also be carried on original investigation by the members of the staff and their senior students. For the science subjects adequate laboratories and equipment will be needed. Both for the arts and for the science subjects the university library will need to be greatly strengthened by means of a capital grant and a recurring grant. We lay great stress on adequate grants for periodicals. We do not regard Rs. 30,000 to Rs. 40,000 a year as at all excessive as a library grant (for the purchase and binding of books, and exclusive of the salaries of the staff) for a university situated far from the resources of a great capital. Indeed we regard a strong library as an essential factor for making Dacca a university not only in name but in fact. It is futile to gather together a large number of able men, without providing them with the necessary instruments for their work.

86. It is impossible to foretell exactly on what lines the Dacca University will develop from its beginning. Its teachers and investigators, if they are given time and opportunity, will not wait for new openings, especially on the scientific side. Mr. Patrick Geddes, in his suggestive and stimulating report on the town planning of Dacca, has made various interesting proposals.

Horticulture might well develop out of the department of botany, even before a Faculty is started in agriculture; and pisciculture out of the department of zoology. Bio-chemistry, that new and fertile field, might well be cultivated by cooperation between the already active department of chemistry and the new departments of biology and physiology to be created; and it will be wise for Dacca to co-operate with the University of Calcutta, as some of our correspondents suggest, so that in the more specialised branches there may not be wasteful overlapping. There is plenty of work for all the universities in India. They can only gain by such co-operation.

87. We shall in Chapter LI deal briefly with the financial aspects of our proposals. We recommend that a beginning should be made at once and that all the elements of our scheme should be dealt with as soon as the financial situation permits.

### *III.—The teaching organisation of the University.*

88. The Dacca University Committee proposed that all the officers and teachers of the University should be Government servants, and that of these a large number, though not all, should belong to the three Government educational services. They also suggested that a distinction should be made between professors serving directly under the University and college professors. The scheme has been subjected to criticism on the ground that in fact, though not in theory, it would involve an unnecessary differential treatment of European and Indian teachers. We propose a simpler system, under which the whole of the teaching appointments (after the initial appointments) will be made by the University, a certain number being made on the nomination of a selection committee in England.<sup>1</sup> It would also be desirable that such selection committees should have a permanent nucleus.

The appointments would therefore be to specific university posts and not to a Government educational service; but they would be made under a contract defining salary, period of service, conditions of leave, retiring allowance, etc. We recommend that the Government of Bengal should, as a rule, for all major posts (*i.e.*, professorships, readerships and the higher administrative offices) guarantee the performance of the contract and endorse it; but

<sup>1</sup> See paras. 58 and 59 above, and also Chapter XXXIV, paras. 112—120.

apart from this guarantee the Government of Bengal should not have any direct responsibility in regard to or control over the incumbents of the posts. With such a guarantee the position of the teachers would be not less secure than under Government service.<sup>1</sup> We may point out that the Government will have the power of enforcing the guarantee without difficulty in respect of the posts for which the salary is supplied out of Government funds; and we do not suggest that such a guarantee should necessarily be given in the case of temporary appointments or of those paid for out of funds not provided by Government. Government might be willing, however, to give such a guarantee in the case of a chair of which the emoluments were provided wholly or mainly from a trust fund, if it were thought desirable in any particular case.

89. We suggest that there should be four main categories of teachers:—

- (1) *Professors*.—The title of professor should not be given in respect of any post carrying a salary of less than Rs. 600 *per mensem*.<sup>2</sup> The normal salary should we think be considerably higher, and we think it must be clearly recognised that while in India as in England it is desirable to fix a minimum salary in order to preserve the proper status and dignity of a chair, it would be impracticable to fix a uniform scale for all chairs. A university, like other employers, is bound to compete in the open market for its teachers, and in certain branches and cases it will be obliged to pay salaries far exceeding the minimum in order to secure the services of teachers essential for the education of its students. We may point out that such differences of salary, as between the occupants of different chairs, are customary in England. The variations and increments of salaries must be left to the University to settle.

It is clear that the educational success and achievements of the new University will depend in great measure upon the personality

<sup>1</sup> See paras. 52 and 53, above. Dr. Zia-ud-din Ahmad and Dr. Gregory are of opinion that if the Government are unwilling to give the guarantee suggested the members of the superior staff should be Government servants.

<sup>2</sup> An exception should be made in the case of missionary teachers of distinction who on religious grounds accept only a small salary in return for their services.

and attainments of the professors first appointed. We agree with the Dacca University Committee that in certain cases it may be necessary to offer as large a salary as Rs. 2,000. One of the advantages of freedom from the restraints of Government service will be that the University (acting, in the case of posts recruited in England, on the advice of committees of selection) will be able to decide after consideration of the field available in what cases it will be necessary to offer salaries of a higher amount than the normal.

- (2) *Readers*.—A reader should be a teacher of approximately the same standing as a professor, capable of acting as head of a department. Departments started on a small scale or in which the total number of students is not likely to be large and sub-departments might be placed in charge of a reader. Thus, if the University is unable to afford a professorship of geography or of botany in the first instance, these subjects might be started under a reader; and if it cannot afford separate chairs for such branches as organic chemistry, inorganic chemistry, and physical chemistry, the head of the department might devote himself to one of these branches, while there would be a reader in at least one, and possibly both, of the others. One of the objects of appointing to readerships is to allow teachers to specialise instead of requiring them to cover the whole field. But this policy should not preclude a reader from taking some share of the elementary teaching required by all students, so long as it did not interfere with the special object of his appointment.

We think that the title of reader should not be conferred in respect of any post carrying a salary of less than Rs. 400 *per mensem*; and that the salary of a reader might rise to Rs. 600 *per mensem*. A reader should be regarded as eligible for promotion to a professorship, if such promotion were desirable and funds were available.

- (3) *Lecturers*.—These would be teachers with a normal salary of Rs. 250—25—400.

- (4) *Junior Assistants*.—These would in general be young men serving their apprenticeship in the teaching

profession, and appointed at a fixed salary for a term, ordinarily of not more than three years. We are advised that while the right kind of man could be secured in the Faculty of Arts for a salary of Rs. 100 *per mensem*, it will be necessary to pay Rs. 150 in the Faculty of Science. We think that junior assistants should in addition have free quarters provided for them in one of the University halls or hostels. While we presume that the majority of the posts of this kind will in course of time be filled by Dacca graduates, the University should be at liberty to select their occupants in such manner as it thought best.

90. We recommend that the methods of appointment of professors and readers should be the same, *mutatis mutandis*, as those recommended for corresponding appointments in Calcutta<sup>1</sup> and should be prescribed by statute.

There would of course be no appointments in Dacca corresponding to the appointments at colleges in Calcutta, except possibly in the case of a teacher whose salary was in part provided by the religious body responsible for the organisation of a hostel.<sup>2</sup> It would be for the University to settle the mode of appointment by statute or ordinance if such a contingency arose. We think it premature to provide machinery for it here.

The methods of appointment to lectureships and to the post of junior assistant should be prescribed by ordinance.

91. We have proposed that the ordinary teaching unit should be the department, which will be a subordinate unit of the faculty, though certain departments, *e.g.*, the department of mathematics, would belong to more than one faculty. The department would comprise all the teachers of the subject in question. Each department should have a responsible head, usually a professor, but in some cases a reader, responsible for its organisation; and the teachers belonging to it should meet at least once a term.

92. It would be unwise to lay down any hard and fast rule for the limits of departments, but as examples of subjects which are

<sup>1</sup> Chapter XXXIV, paras. 112—120.

<sup>2</sup> Para. 163 below.

sufficiently extensive to require departmental organisation we suggest the following :—

- \* (1) Islamic Studies, including Arabic.
- \* (2) Persian and Urdu.
- \* (3) Sanskrit and Bengali.
- (4) Sanskritic Studies.
- \* (5) English Language and Literature.
- (6) Modern European Languages.
- \* (7) Philosophy (including Psychology).
- \* (8) History and Political Science.
- \* (9) Economics.
- (10) Anthropology (including Sociology).
- \* (11) Mathematics (including Astronomy).
- \* (12) Geography.
- \* (13) Physics.
- \* (14) Chemistry.
- (15) Geology.
- \* (16) Botany } In the first instance it may be necessary for
- \* (17) Zoology } these two departments to be combined, but
- they should be separated as soon as possible.
- (18) Physiology.
- \* (19) Law (this would also be a Faculty).
- \* (20) Education.

In the foregoing list we have marked with an asterisk all those departments which it seems to us essential to establish at the inception of the University, though not necessarily all on the same scale. We think that in view of the total cost of the scheme it might be found necessary to have only one teacher of the rank of professor for the two subjects of botany and zoology, acting as head of a single department : but there should also be a lecturer either in zoology, if the head of the department were primarily a botanist, or in botany, if the head were primarily a zoologist. A demonstrator would also be required in each of these subjects. We do not recommend the establishment in the first instance of a department of modern European languages, but we think a competent teacher should be appointed to give instruction in French and German to those students who will require tuition in those languages in order to pursue their special studies, whether in science or in arts subjects. The teaching of modern European languages should be developed gradually.

93. Though we do not place this subject in the same category with those in the foregoing list, we hope that a readership in statistics, which is now becoming more and more recognised as a 'key' subject, may soon be established. The recent applications of statistics to problems of economics, sociology, public health, experimental psychology and education have made it an indispensable aid to the grasp and investigation of many branches of these subjects as well as of other subjects in which measurements and enumerations are of importance.

94. A department might include two or more professors or readers in its personnel. But in every case one of the senior members of the department would act as its head, and in the case of a department involving a laboratory, the head would be responsible for the laboratory organisation and expenditure.

95. Each large department will require small rooms for lectures to a comparatively small number of students besides the use of one or more big lecture rooms. The arrangement of time-tables with a view to the economical use of the lecture-rooms, and the provision of the necessary facilities for students taking lectures in different departments, is a problem of all teaching universities. In dealing with the University of Calcutta in Chapter XXXIV, we have suggested arrangements in regard to pass and honours undergraduate teaching which should also be applicable to Dacca.<sup>1</sup> The problem of the time-table for pass students will be materially simplified if the University prescribes that students shall take groups of correlated subjects, instead of being allowed to choose what they think to be the easiest combinations of subjects from the pass list.<sup>2</sup>

96. The time-table for each department should be settled in the first place by the head of that department after consultation with all the members. It should be the aim of the head of the department to find for each member a happy mean which, without overloading him by an excessive amount of work on a single day, will nevertheless give him a substantial amount of free time so arranged as to enable him to pursue his own independent work and reading, without which his teaching will become sterile and obsolete. On the other hand, there must be some co-ordinating agency between the different departments, so that their arrangements shall not

<sup>1</sup> Chapter XXXIV, paras. 35-47; see also Dacca Report, pages 25-28.

<sup>2</sup> Cf. the suggestions of Sir Gooroo Dass Banerjee in his answer to Question 4.

unduly clash and render impossible selections of subjects which would be in the interest of a number of students. This co-ordination might be effected either by the Vice-Chancellor or by the Deans of the Faculties.

97. It is important that in addition to the general library special libraries for higher work should be provided for the various departments. In the science departments these should be attached to the laboratories. In the arts departments the books should be placed in the room in which seminar teaching is carried on. It might be convenient in subjects like history that the seminars should be held in the rooms belonging to the university library in which the historical collections are housed. The books of the departmental libraries should be regarded as forming part of the general university library, and available for consultation (though not for purposes of borrowing) by its readers, unless, without undue expense, and gradually, it is found possible to provide duplicates for departmental use solely.

98. *Department of Islamic Studies.*—The proposal to establish a strong department of Islamic studies on modern lines, combining with instruction in those studies a thorough grounding in the English language, forms an essential feature in the Dacca University scheme, and we fully endorse the desirability of establishing a department of Islamic studies on these lines.

The university scheme of the Dacca Committee was based on a scheme proposed for the creation of 'reformed' madrasahs which has since been carried into practice, with some modifications, and is described in its present form in Chapters VI and XVI. In order fully to explain our views as to the immediate and future development of the department of Islamic studies in the University, it is necessary to recall here the main outlines of the curriculum of these madrasahs. Their four years' course includes Arabic language and literature, rhetoric, Muslim law, logic, a vernacular (Urdu or Bengali), Indian history, arithmetic and geometry, and English. Logic, rhetoric and Muslim law are taught in Arabic from modern books. History and arithmetic and geometry are taught in English. The standard in Arabic is much higher than that of the compulsory and additional Arabic in the matriculation course; the standard in English is the same; the standard in arithmetic and geometry is also the same as the

matriculation standard, but the omission of algebra makes the general standard in mathematics lower than at the matriculation.<sup>1</sup>

We now come to the university course, as proposed by the Dacca Committee. It was to be divided into a junior course of two years and a senior course of two years, for the bachelor's degree, followed by a course of two years for the master's degree; and as a part of the general university scheme of advanced study and research there was to be a doctorate of Islamic studies. The Dacca University Committee define the object of the bachelor's course as follows :—

“ The object of the university course will be to produce ripe Arabic scholars who possess in addition a thorough knowledge of English. We consider that a student thus trained will become a man of culture, who should make a good Government officer or a suitable recruit for the learned professions. The course in English should be the same as that of the pass B.A. whilst the curriculum in Arabic and Islamic subjects should lead gradually to a very high level of attainment.”<sup>2</sup>

99. The Committee proposed that the degrees awarded in connexion with the course should be styled Bachelor of Islamic Studies and Master of Islamic Studies. They also recommended that the students who were successful at the intermediate examination in Islamic studies after the first two years of work should be described as having passed the first examination in Islamic studies and allowed to use the title of F. I.

They further recommended that the degrees of B.I. and M.I. should be regarded as equivalent to the degrees of B.A. and M.A. for Government employment and admission to the B.L. course; and also that a B.I. should be permitted to follow the M.A. course in English and to take the M.A. degree in that subject.

100. In anticipation of the adoption of the Dacca scheme Government have established the reformed madrassah curriculum with its English course; and in view of the postponement of that scheme they have decided to open at the Dacca Madrassah a course corresponding to the first two years of university work for the B. I. degree. The course will begin in 1919. We have recommended that the intermediate course in arts and science should be regarded as higher school work and carried on in special colleges

<sup>1</sup> See Chapter XVI, paras. 108-110.

<sup>2</sup> Dacca Report, page 100.

which we have termed Intermediate Colleges. We think that in the same way the first two years of the course of Islamic studies proposed by the Dacca University Committee should be provided before entrance to the University (either, as will be done shortly at the Dacca Madrassah, or, if it were thought necessary, at a special institution), so that the students in this department may reach approximately the same standard of maturity at entrance as the ordinary students in arts and science; but in other respects we think that, at any rate on the establishment of the University, the scheme proposed by Mr. Nathan's Committee, as a result of much discussion, must necessarily be adhered to in its main lines. The change which we have recommended above is a change in organisation and not in curriculum; and in fact the temporary provision made by the Government of Bengal in connexion with the Dacca Madrassah exactly fits what we propose as the normal organisation of Islamic studies on the establishment of the University.

101. The only other change which we desire for the near future is that the 'senior course' of the Dacca University Committee should be extended, like the other degree courses at Dacca, from two to three years. We endorse the proposals of the Dacca Committee generally in regard to the staff required for the Department of Islamic Studies, including the proposal that the department should include a European professor.<sup>1</sup>

102. We hope that the new school will exercise a stimulating influence over the reformed madrassahs from which it will derive the great majority of its students, and that it will eventually lead to the creation of a school of learned men capable of producing important and original studies on Arabic philosophy and science, in addition to the much larger number of graduates who will become teachers in schools, inspectors, and members of Government administrations. A certain number will no doubt proceed to the Law Faculty and specialise in Muslim law, while others will proceed to the M.A. degree in English or in Arabic.

103. But if the Department of Islamic Studies is to take its rightful place in the University, to exercise influence over the other departments and to be influenced by them, it must in no sense be

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<sup>1</sup> Dacca Report, page 100.

regarded as a water-tight compartment. In accordance with what we understand to be Muslim tradition, it should be open to students of all denominations, although no doubt the vast majority will be Musalmans. And we think that students choosing their main subjects in other departments should be permitted to take as subsidiary subjects studies in the Islamic department. Thus the study of Islamic history might well be taken by a number of honours students in history; students devoting themselves mainly to Sanskritic philology might take Semitic philology as a subsidiary subject, and so on.

104. Conversely, we should desire that a student offering Islamic history as part of his course might be allowed, if he so wished, to take a corresponding period of European or Indian history, and that a student offering Arabic astronomy might be allowed to offer at the same time modern astronomy with the necessary mathematics. In the past, owing to the fact that men of science have as a rule had no adequate training in Arabic, and Arabic scholars have had no adequate training in science, great difficulty has arisen in studying the specialised contributions to mathematics, science (especially astronomy), and philosophy, which form so important a part of Arabic writings.<sup>1</sup> If our proposals could be carried out the Dacca University might play a really important part in the elucidation of a great period of history and civilisation. But we are confronted with a difficulty. The intermediate madrassah course in its present form as recommended by Mr. Nathan's Committee cannot furnish the student with a course of training which, as a preparation for western studies at the University, could be regarded as strictly comparable with the improved course which we propose for the intermediate colleges.

105. We wish therefore to suggest, for the above and for other reasons which we shall develop in the next paragraph, that it might be desirable to constitute, in addition to the present course of the intermediate madrassah, an alternative course, including the fundamental elements of Islamic studies, together with other elements: a course, which would comprise the subjects demanded by the University as compulsory for entrance to the Faculty of

<sup>1</sup> For a further discussion of questions relating to Islamic studies see Chapters VI, XVI and XLII. The objections to the scheme of the Dacca University Committee raised by Mr. J. R. Cunningham, Director of Public Instruction for Assam, in response to Question 4 are referred to in Chapter XVI, para. 96.

Arts, and would so lead up to an arts degree in Islamic studies. We should welcome such a development.

106. We are aware that opinions have been expressed in favour of conferring the B. A. instead of the B. I. degree on successful students of the Department of Islamic Studies under the scheme proposed by the Dacca University Committee. Mr. Mohamed Ali, a member of the Dacca Committee, in a supplementary minute appended to the report, putting forward arguments similar to those which we have ourselves put forward above, suggested that arts students should be permitted to substitute a subject included in Islamic studies for an alternative arts subject, and that undergraduates taking up Islamic studies should be permitted to substitute a science or an arts subject for one of those included in the course of Islamic studies; and that the degree conferred on successful students after a course of Islamic studies should, in any case, be called the B. A. and not the B. I. The complete separation of Islamic studies from the ordinary arts course raised three apprehensions in his mind: he feared that the method of teaching Islamic subjects might remain as old-fashioned as before instead of being thoroughly modernised; that the status and the prospects of the teachers of Islamic subjects might suffer; and that the prestige of the new degrees and the prospects of their recipients might be less than the prestige of the degree and the prospects of graduates in the Faculty of Arts. The proposal to substitute the B. A. for the B. I. degree was also supported by Mr. A. H. Harley Principal of the Calcutta Madrasah, and by others in their written evidence, and by Shams-ul-Ulama Abu Nasr Waheed, Superintendent of the Dacca Madrasah and a member of the Dacca University Committee, in his oral evidence before us at Dacca. We think the course proposed by the Dacca University Committee would be a solid and valuable course, but it would not necessarily connote that familiarity with western influences and methods of study which we think ought to be connoted by the B. A. degree. We have pointed out above that we should welcome the conferment of an arts degree in Islamic studies, but we think it should be conferred only on students who have received an adequate basis of western education and have pursued their Islamic studies with a knowledge of the critical methods employed by western scholars.<sup>1</sup>

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<sup>1</sup> See also Chapter XLII, para. 17.

1. *T. trifoliata*, DC.; H.f. Ind. Fl. i. 507.—A glabrous evergreen shrub, about 5-6 ft. high, armed with sharp thin spines, one at each side of the petiole or on the branchlets; leaves small, on a hardly 2 lin. long petiole, 3- or occasionally 1-2-foliolate; leaflets obovate or oblong, very shortly petioluled, notched, crenate-toothed, membranous,  $\frac{1}{2}$ -1 in. long, glabrous, conspicuously dotted; flowers middling-sized, white, fragrant, solitary or in short cymes in the axils of the leaves; petals about 5 lin. long; berries the size of a pea, globular or depressed globular, glossy, crimson.

HAB.—Tennasserim, apparently only cultivated.—Fl. Fr.  $\infty$ .

### LIMONIA, L.

Calyx 5-lobed or parted. Petals 4-5, imbricate. Disk annular or stalk-like. Stamens 8 to 10, free; the filaments subulate; anthers cordate or linear-oblong. Ovary 4-5-celled, with a solitary ovule in each cell; style rather short and thick, deciduous. Berry globose, 1-4-seeded. Seed enveloped in pulp.—Small trees or shrubs, often spiny, with alternate unpaired-pinnate leaves, the rachis more or less winged. Flowers in fascicles or racemes.

Spiny little tree; leaflets opposite; inflorescence puberulous *L. acidissima*.  
Unarmed slender shrub; leaflets alternate; inflorescence glabrous *L. alternans*.

1. *L. acidissima*, L.; H.f. Ind. Fl. i. 507; Bedd. Sylv. Madr. 45, t. 7, f. 3; Brand. For. Fl. 47.—*Thee-haya-za*.—A little tree, 20 to 25 ft. high, armed with sharp prickles at both sides of the petioles, the younger parts more or less puberulous; leaves unpaired-pinnate, the rachis broadly leafy-winged; leaflets in 2-4 pairs with an odd one, opposite, oblong or oblong-lanceolate, almost sessile, notched or blunt, glabrous or along the nerves on both sides or rarely the whole under-surface puberulous, conspicuously pellucid-dotted; flowers rather small, white, in short (usually solitary or paired) sometimes leafy racemes or poor lax cymes arising from above the scars of the fallen leaves; petals 4, elliptically oblong, about  $2\frac{1}{2}$  lin. long; stamens 8; ovary 4-celled, the style rather long and thick; berries globular, the size of a small pea, 1-4-seeded, bluish-black.

HAB.—Ava, apparently frequent; also in Promo District.—Fl. H.S.; Fr.R.S.

2. *L. alternans*, Wall; H.f. Ind. Fl. i. 508.—A slender simple or rarely branched unarmed shrub, shedding leaves in H.S., 2-4 ft. high, all parts quite glabrous; leaves unpaired-pinnate, the rachis narrowly winged; leaflets in 5-7 pairs with an odd one, alternating, oblong-lanceolate to lanceolate, almost sessile, oblique, acuminate, 1-1 $\frac{1}{2}$  in. long, crenate, glabrous, pellucid-dotted; flowers 5-merous, appearing with the young leaves, small, white, forming short glabrous shortly peduncled or almost sessile cymes on short axillary branchlets and axillary; calyx-lobes 3-gonous-oblong, acute,  $\frac{1}{2}$  lin.

long; petals 3 lin. long, rather acute; stamens 10, alternately shorter; ovary obovate, smooth, 2-celled, the torus elongating after flowering; berries ovoid, shortly stalked, about 2 lin. long, smooth.

HAB.—Not unfrequent in the upper mixed and occasionally in the moist forests of the Pegu Yomah, sporadical but usually gregarious.—Fl. May.—I.—SS.=SiS.

### PARAMIGNYA, Wight.

Calyx cupular or small, 3-5-lobed or -toothed. Petals 4-5, free, imbricate or rarely induplicate-valved. Stamens 8-10, rarely more, free; filaments linear; anthers linear-oblong to oblong. Disk thick and stalk-like. Ovary 3-5-celled, with 1 or 2 ovules in each cell; style often elongate, deciduous. Berry with a thick leathery skin, 1-5-celled and -seeded. Testa of seeds usually membranous. Armed or unarmed trees or shrubs, often scandent, with simple entire leaves. Flowers middling-sized or small, axillary, solitary, clustered or in racemes or short panicles.

\* Petals about 8 lin. long. Calyx largish, cupular, broadly lobed.

Style elongate; calyx and pedicels tomentose, the latter as long or a little longer than the calyx . . . . . *P. monophylla*.

Style short; calyx and the pedicels glabrous, the latter 1 in. or thereabouts long . . . . . *P. grandiflora*.

\* \* Petals 2-4 lin. long. Calyx small, with acute lobes.

○ Berries terete.

Young shoots more or less puberulous; style short, hirsute or villous . . . . . *P. Griffithii*.

Glabrous; style very short, like the ovary glabrous . . . . . *P. citrifolia*.

○ ○ Berries 3-4-angular.

Erect tree, the spines 1-1½ in. long, straight; calyx glabrous . . . . . *P. angulata*.

1. *P. monophylla*, Wight; H.f. Ind. Fl. i. 510.—A scandent evergreen shrub, usually armed with 8 to 10 lin. long axillary recurved spines; leaves elliptically oblong, oval or oblong, usually shortly acuminate, sometimes rounded or blunt, entire or obscurely crenate, glabrous or beneath on the midrib pubescent, 2½-4 in. long; flowers solitary or by 2-4, on 2-4 (-6) lin. long tomentose pedicels, axillary; calyx cup-shaped, broadly 5-lobed, the lobes rounded or square, entire, notched or retuse; petals oblong, 6-8 lin. long, imbricate; stamens 10 (or 12); filaments pilose; ovary pilose; berries "ovate pear-shaped or obovate, pubescent or almost glabrous."

HAB.—Tenasserim, at 5,000 ft. elevation (according to Oliver).

2. *P. grandiflora*, Oliv.; H.f. Ind. Fl. i. 510.—A small tree, armed with very short almost straight spines or nearly unarmed, the softer parts puberulous; leaves ovate-oblong to elliptically oblong, on a puberulous rather slender jointed petiole 3 to 8 lin. long, bluntish apiculate, 2½-3 in. long, sparingly pubescent beneath and glabrescent; flowers large, usually solitary, on an 8-12 lin. long glabrous pedicel,

1. *T. trifoliata*, DC. ; H.f. Ind. Fl. i. 507.—A glabrous evergreen shrub, about 5-6 ft. high, armed with sharp thin spines, one at each side of the petiole or on the branchlets; leaves small, on a hardly 2 lin. long petiole, 3- or occasionally 1-2-foliolate; leaflets obovate or oblong, very shortly petioluled, notched, crenate-toothed, membranous,  $\frac{1}{2}$ -1 in. long, glabrous, conspicuously dotted; flowers middling-sized, white, fragrant, solitary or in short cymes in the axils of the leaves; petals about 5 lin. long; berries the size of a pea, globular or depressed globular, glossy, crimson.

HAB.—Tennasserim, apparently only cultivated.—Fl. Fr. ∞.

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Calyx 5-lobed or parted. Petals 4-5, imbricate. Disk annular or stalk-like. Stamens 8 to 10, free; the filaments subulate; anthers cordate or linear-oblong. Ovary 4-5-celled, with a solitary ovule in each cell; style rather short and thick, deciduous. Berry globose, 1-4-seeded. Seed enveloped in pulp.—Small trees or shrubs, often spiny, with alternate unpaired-pinnate leaves, the rachis more or less winged. Flowers in fascicles or racemes.

Spiny little tree; leaflets opposite; inflorescence puberulous *L. acidissima*.  
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2. *L. alternans*, Wall; H.f. Ind. Fl. i. 508.—A slender simple or rarely branched unarmed shrub, shedding leaves in H.S., 2-4 ft. high, all parts quite glabrous; leaves unpaired-pinnate, the rachis narrowly winged; leaflets in 5-7 pairs with an odd one, alternating, oblong-lanceolate to lanceolate, almost sessile, oblique, acuminate, 1-1½ in. long, crenate, glabrous, pellucid-dotted; flowers 5-merous, appearing with the young leaves, small, white, forming short glabrous shortly-peduncled or almost sessile cymes on short axillary branchlets and axillary; calyx-lobes 3-gonous-oblong, acute,  $\frac{1}{2}$  lin.

long; petals 3 lin. long, rather acute; stamens 10, alternately shorter; ovary obovate, smooth, 2-celled, the horns elongating after flowering; berries ovoid, shortly stalked, about 2 lin. long, smooth.

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\* Petals about 8 lin. long. Calyx largish, cupular, broadly lobed.

Style elongate; calyx and pedicels tomentose, the latter as long or a little longer than the calyx

. *P. monophylla*.

Style short; calyx and the pedicels glabrous, the latter 1 in. or thereabouts long

. *P. grandiflora*.

\* Petals 2-4 lin. long. Calyx small, with acute lobes.

○ Berries terete.

Young shoots more or less puberulous; style short, hirsute or villous

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Glabrous; style very short, like the ovary glabrous

. *P. citrifolia*.

○ Berries 3-4-angular.

Erect tree, the spines 1-1½ in. long, straight; calyx glabrous

. *P. angulata*.

1. *P. monophylla*, Wight; H.f. Ind. Fl. i. 510.—A scandent evergreen shrub, usually armed with 8 to 10 lin. long axillary recurved spines; leaves elliptically oblong, oval or oblong, usually shortly acuminate, sometimes rounded or blunt, entire or obscurely crenate, glabrous or beneath on the midrib pubescent, 2½-4 in. long; flowers solitary or by 2-4, on 2-4 (-6) lin. long tomentose pedicels, axillary; calyx cup-shaped, broadly 5-lobed, the lobes rounded or square, entire, notched or retuse; petals oblong, 6-8 lin. long, imbricate; stamens 10 (or 12); filaments pilose; ovary pilose; berries "ovate pear-shaped or obovate, pubescent or almost glabrous."

HAB.—Tenasserim, at 5,000 ft. elevation (according to Oliver).

2. *P. grandiflora*, Oliv.; H.f. Ind. Fl. i. 510.—A small tree, armed with very short almost straight spines or nearly unarmed, the softer parts puberulous; leaves ovate-oblong to elliptically oblong, on a puberulous rather slender jointed petiole 3 to 8 lin. long, bluntnish apiculate, 2½-3 in. long, sparingly pubescent beneath and glabrescent; flowers large, usually solitary, on an 8-12 lin. long glabrous pedicel,

axillary; calyx glabrous, the lobes broad and rounded, ciliate; petals obovate-oblong, about 8 lin. long or longer; stamens 10; the filaments free and villous; ovary 5-celled, the style very long, villous towards the base.

HAB.—Tenasserim.—Fl. Aug.

3. *P. Griffithii*, H.f. Ind. Fl. i. 510.—An evergreen large scandent shrub, armed with sharp somewhat curved spines, the younger parts pubescent or puberulous; leaves oblong to elliptical, abruptly and bluntish acuminate to apiculate, on a slender puberulous or glabrous petiole 2-4 lin. long, 3-5 in. long, chartaceous or thin coriaceous, glabrous or while young puberulous beneath; flowers rather small, white, on short puberulous pedicels, by 1-3 in the axils of the leaves; calyx small, puberulous, 5-toothed; petals about 3-4 lin. long; ovary and the long style pubescent; berries ovate, glabrous, the size of a cherry, terete.

HAB.—Ava and Pegu.

4. *P. citrifolia*, H.f. Ind. Fl. i. 510.—A much-branched rigid scandent shrub, well armed with short curved spines, all parts glabrous; leaves elliptical to elliptically oblong, 4-5 in. long, shortly petioled, bluntish acuminate, glabrous; flowers small, white, on 2-3 lin. long puberulous or glabrous pedicels, solitary or forming poor clusters in the axils of the leaves; calyx shortly 5-toothed; petals oblong, about 3-4 lin. long; stamens 10, the filaments free, glabrous; ovary glabrous, tapering in a short glabrous style; berries ovoid, as large as a lime, yellow, containing 1-4 oblong seeds.

HAB.—In the tropical forests of the Andamans; also in Chittagong.—Fl. June-July.—s: l.

5. *P. angulata*, (*P. longispina*, H.f. Ind. Fl. i. 511).—A small rigid tree, fearfully armed with  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long sharp cylindrical thorns arising on each side of the petioles, all parts glabrous; leaves elliptical to elliptically oblong, on a glabrous petiole 2-3 lin. long, acute or blunt, 3-4 in. long, glabrous, coriaceous; flowers small, white, fragrant, on very short, glabrous pedicels, solitary or by 2-3 in the axils of the leaves; calyx small, 5-toothed, glabrous; berries ovate, the size of a plum, 3-5-lobed-angular, acuminate, glabrous, seated on the very short torus.

HAB.—In the tidal and mangrove forests of Lower Pegu and Upper Tenasserim.—Fr. Apr.-May.—SS.—Sal.

REMARKS.—Wood white, close-grained.

### ATLANTIA, Corr.

Calyx 3-5-lobed or -parted, or irregularly splitting. Petals 3-5, free or adnate to the stamens and united with them into a tube,

imbricate. Stamens 6-8, rarely 15-20, inserted round an annular or cup-shaped disk; filaments usually irregularly connate or rarely free; anthers short, ovate or cordate-oblong. Ovary 2- or 4- rarely 3-5-celled, with a solitary or 2 collateral ovules in each cell; style deciduous, with a capitate stigma. Berry almost globular, with a leathery rind, pulpy inside. Seeds oblong, the cotyledons plano-convex, fleshy.—Unarmed or more usually spiny shrubs or trees, with simple leaves. Flowers axillary or terminal, fasciated or solitary, or in cymes or racemes.

× Calyx irregularly lobed, split to the base on one side.

Berries the size of a large pea or small cherry . . . . . *A. monophylla*.

Berries the size of a wood-apple . . . . . *A. macrophylla*.

× × Calyx regularly 4-lobed; flowers in short racemes . . . *A. caudata*.

1. *A. monophylla*, Corr.; H.f. Ind. Fl. i. 511; Bedd. Fl. Sylv. 44.—A large evergreen shrub, growing out into a small tree, sometimes unarmed, but more frequently armed with solitary axillary, very strong and sharp spines, the young shoots often puberulous; bark pretty smooth, of a greenish ash colour; leaves from oblong to lanceolate- and ovate-oblong, very variable in size, 1-2 in. long and longer, on a puberulous or glabrous petiole 2-3 lin. long, notched, coriaceous, glabrous, or puberulous along the midrib beneath; flowers rather small, white, on about an in. long, slender, usually puberulous but soon glabrescent pedicels, forming short racemes or cymes in the axils of the leaves; calyx deeply 2-3-cleft, the lobes entire and somewhat scarious, or one of them again 2-lobed, glabrous or sparingly puberulous; petals about 4-5 lin. long; stamens usually 10, the broad glabrous filaments united in a long tube; anthers cordate-ovate; ovary glabrous, 4- rarely 3- or 5-celled with one or 2 ovules in each cell; berries globose, the size of a bullet, yellowish, glabrous, often 4-seeded.

HAB.—Ava.—Fl. Octob.-Nov.; Fr. Febr. SS. = Cn. (?)

REMARKS.—Wood heavy, hard, white or yellowish, very fine and close-grained. A sort of box-wood; suitable also for cabinet work and for turning.

2. *A. macrophylla*, Kz.—An evergreen tree, 25-30 ft. high, all parts glabrous, almost unarmed; leaves ovate to ovate-oblong and almost rhomboid-ovate, on a 2 lin. long petiole, notched, 1½-3 in. long, coriaceous, glabrous; flowers shortly racemose, axillary, the pedicels in deflorate ones 3 to 8 lin. long, very stiff; berries globose, the size of a wood-apple, glabrous.

HAB.—Frequent in the beach forests of the Andamans; also Tenasserim. Fr. Apr.-May.—1.-SS. = Aren.

## CITRUS, L.

Calyx cup-shaped or urceolate, 3-5-cleft. Petals 4-8, imbricate. Stamens from 4 to 60; the filaments free or variously united or

polyadelphous; anthers oblong. Disk large, cup-shaped or annular. Ovary many-celled, with 4 to 8 biseriate ovules in each cell; style terete, deciduous; stigma capitate or lobed. Berry leathery-skinned, many-celled, with thin membranous dissepiments, the cells more or less filled with transverse pulpy cells. Testa of seeds almost membranous, containing sometimes 2 or more embryos. Albumen none.—Trees or shrubs, usually armed, with 1-foliolate, entire or crenate leaves, the petioles often winged. Flowers small or middling-sized, axillary, solitary, or in clusters or short panicles. Berries often large.

× Young shoots and nerves of the leaves beneath pubescent or puberulous; flowers large . . . . . *C. decumana*.

× × All parts glabrous.

○ Style very short.

Flowers small; stamens 4 or 5, free; petioles leaf-like expanded . *C. Hystrix*.

○ ○ Style as long as the ovary or longer.

† Petals 8-10 lin. long.

Leaves acuminate or acute; berries globose, without a knob; filaments cohering by 3-4 . . . . . *C. aurantium*.

Leaves blunt or nearly so; berries oblong, rarely globose, with a knob; the skin usually thick; filaments free or polyadelphous. *C. medica*.

† † Petals 3-4 lin. long.

Calyx small; berries globose, sweet or acid, the skin usually thin . *C. nobilis*.

1. *C. decumana*, L.; H.f. Ind. Fl. i. 516; Brand. For. Fl. 55. —*Shouk-ton-ok*.—An evergreen tree (25—30 + 8—15 + 3—4), the branches more or less armed with axillary straight thorns shorter than the petioles, the younger parts all pubescent or puberulous; leaves oblong or ovate-oblong, about 2-4 in. long, blunt or acute, more or less crenate, glabrous except the pubescent midrib beneath, glossy above; petioles of the lower leaves often short and not winged, the upper ones all jointed and leaf-like winged; flowers rather large, white, forming short pubescent or puberulous racemes; style thick, longer than the pubescent ovary; berries drooping, as large as a man's head, globose or nearly so, filled with rosy or greenish-white loose sweet or somewhat bitter large vesicles; skin 1-1½ in. thick and thicker, green or yellowish outside; spongy and pure white within.

HAB.—Frequently cultivated all over Burma, especially in the southern provinces.—Fl. Febr.-March; Fr. Sept.-Nov.

2. *C. Hystrix*, DC.; H.f. Ind. Fl. i. 515.—*Shouk-pote*.—A small shrubby tree or much-branched shrub, armed with longer or shorter straight axillary solitary spines, all parts glabrous; leaves oval or ovate, 1½-2 rarely 3 in. long, usually blunt or retuse, almost entire or crenate, glabrous; petiole 1-1½, often 2-3 in. long, leaflike expanded and often larger than the blade itself, obversely cordate or obovate-oblong, at base contracted in a simple petiole; flowers 4- or 5-merous, small, white, on very short glabrous pedicels, form-

ing small clusters in the axils of the leaves or sometimes almost solitary; calyx small; petals about 3 lin. long; stamens numerous; ovary obovate, terminated by a very short thick style; berries obovate or irregularly globose, the size of a citron or larger, very uneven and warty, almost juiceless, with a thick yellow skin.

HAB.—Not unfrequent in the tropical forests of the Martaban hills east of Sittang; also on the hills of Upper Tenasserim. Often cultivated in native gardens.—s.—SS.= Meiam?

3. *C. aurantium*, L.; H.f. Ind. Fl. i. 515; Brand. For. Fl. 53.—An evergreen tree (25—30+8—10+3—4), armed with short straight axillary spines, all parts glabrous; leaves ovate- to oblong-lanceolate, acuminate,  $2\frac{1}{2}$ — $3\frac{1}{2}$  in. long, crenate-toothed or almost entire, glabrous; petiole 4-6 lin. long, narrowly winged; flowers rather large, by 2 or more in the axils of the leaves, white, fragrant; calyx large, broadly 5-toothed; petals 5, oval-oblong, 8-10 lin. long; stamens about 20-40, free or slightly coherent; ovary globose, terminated by a very long thick style; berries large, globose or spheroid, orange-coloured, with a thick somewhat wrinkled skin usually easily separable, the cells filled with vesicular sweet, bitter, or acid pulp.

HAB.—Rarely cultivated in villages.—Fr. C.S.

4. *C. medica*, L.; H.f. Ind. Fl. i. 514; Brand. For. Fl. 51.—*Shouk-ta-kwaik*.—A large much-branched evergreen shrub or small tree, usually much armed with shorter or longer axillary straight thorns often longer than the petioles, all parts glabrous; leaves oblong or sometimes obovate, blunt or acute, variable in size, but usually 2-4 in. long, more or less crenate, glabrous, the petioles very short and slender, not or slightly winged or bordered; flowers large, white, usually tinged with purple, usually by 2 or rarely by 3 or solitary in the axils of the leaves, on a very short and often quite reduced peduncle; petals 5, oval-oblong, 8-10 in. long; stamens about 30-50, the filaments free or polyadelphous; ovary with a long thick style; berries obovoid or oblong, terminated by a knob, with a coarse wrinkled citron-coloured skin, the vesicular pulp greenish or yellowish, acid.

HAB.—Cultivated in villages.—Fl. H.S.; Fr. R.S.—SS.=SiS.

REMARKS.—Wood rather heavy, fibrous, but close-grained, soft, white.

5. *C. nobilis*, Lour. (*C. medica* var. *limetta*; H.f. Ind. Fl. i. 515).—A small slender evergreen tree, 15 to 25 ft. high, rarely a shrub, more or less armed with very small axillary straight thorns, all parts glabrous; leaves small, oblong, or elliptically oblong to oval and oblong-lanceolate, about 2-4 in. long, acute or blunt, more or less crenate, glabrous, the petiole rather short, but slender, very

narrowly or rarely broadly winged; flowers small, white, usually solitary, shortly pedicelled; calyx small; petals 5, oval-oblong, 3-4 lin. long; ovary globular with a thick rather long style; berries rather small, from 1-3 in. in diameter, globose to oblong, with a sweet acid or bitter vesicular pulp; the skin nearly smooth and usually thin, orange-coloured or yellow.

HAB.—Very much cultivated all over Burma.—Fl. H.S.; Fr. R.S.

REMARKS.—Wood heavy, yellow, of an unequal coarse fibre, but close-grained, rather hard.

### FERONIA, Corr.

Flowers by abortion polygamous. Calyx deciduous, 5-toothed. Petals 5 (rarely 4 or 6), imbricate. Stamens 10-12, some of them usually imperfect; filaments dilated at base; anthers linear-oblong. Torus short. Ovary 5-6-celled, finally 1-celled, with numerous ovules in several rows along the parietal placentas. Berry globose, with a woody rind, 1-celled, many-seeded. Seeds immersed in a fleshy edible pulp.—Armed trees with unpaired-pinnate leaves. Flowers white, loosely racemose or paniced.

1. *F. Elephantum*, Corr.; H.f. Ind. Fl. i. 516; Bedd. Sylv. Madr. 121; Brand. For. Fl. 56.—*Mahan*.—A leaf-shedding tree (25—30 + 8—10 + 2—3), armed with short straight infra-axillary spines, all parts glabrous; leaves unpaired-pinnate, the rachis slightly or almost not winged; leaflets in 2 or 3 pairs with an odd one, nearly sessile, obovate, sometimes cuneate at base, blunt or retuse, about 1-1½ in. long, obscurely crenate or almost entire, coriaceous, glabrous, glossy above; flowers small, greenish-white, on slender pedicels, forming short terminal or axillary lax racemes or poor panicles; petals about 3-4 lin. long; stamens usually 10, unequal; berries woody, globose, about 1½-2 in. in diameter, one-celled, the numerous seeds immersed in a fleshy edible pulp.

HAB.—Promé district, dry forests (?)—Fl. March-Apr.; Fr. Octob.—1.

REMARKS.—Wood yellowish-white, rather heavy, rather coarsely fibrous, but close-grained, hard, takes a fine polish. Yields a gum, like gum arabic. Lac is also obtained from it.

### ÆGLE, Corr.

Flowers hermaphrodite. Calyx 4- or 5-toothed, deciduous. Petals 4 or 5, imbricate. Stamens numerous; filaments short, subulate; anthers elongate. Disk inconspicuous. Ovary 8-15-celled, with numerous ovules in two series along the placentas, narrowed in a short style. Berry woody, 8-15-celled, the cells many-seeded and filled with mucous pulp. Testa of seeds woolly-mucous.—Armed trees, with 3-foliolate leaves. Flowers rather large, in racemes or panicles.

1. *Æ. marmelos*, Corr.—H.f. Ind. Fl. i. 516; Bedd. Sylv. Madr. t. 141; Brand. For. Fl. 57.—*Ope-sheet* or *ok-shit*.—A leaf-shedding tree (30—40 + 10—15 + 3—4), armed with axillary strong paired or sometimes solitary spines, rarely quite unarmed, the younger parts slightly puberulous; bark greyish, about  $\frac{1}{2}$  in. thick, rather smooth, finally peeling off in small irregular corky flakes; leaves 3-foliate, the rachis terete; leaflets oblong, broadly lanceolate, acute or bluntish acuminate, crenulate, soon quite glabrous, the lateral ones smaller and shortly petioluled or almost sessile, the terminal one much larger and on a rather long petiolule; flowers rather large, white, on slender pedicels, forming lax poor terminal or lateral puberulous racemes; calyx pubescent; petals about 4-5 lin. long; berries woody, as large as an apple, almost globose, oblong, or slightly pear-shaped, smooth, 10-15-celled, each cell containing 6-10 oblong woolly seeds imbedded in a tenacious slimy edible pulp.

IIAB.—Much cultivated, especially in the Prome district, and said to occur also wild in the forests.—Fl. May; Fr. October-Nov.—l.

REMARKS.—Wood light-coloured, usually uniformly yellowish-white, or variegated with veins, heavy, very close-grained, compact, hard and very strong. takes a beautiful polish. The fruits are much liked by the Burmese and others.

*SIMARUBEAE.*

Flowers regular, dioecious, or polygamous, rarely hermaphrodite. Calyx gamosepalous, or 3-5-sepalled. Petals 3-5, hypogynous or slightly perigynous, imbricate or valvate, rarely wanting. Stamens as many or twice as many; anthers versatile, the cells opening by longitudinal slits. Disk under or round the ovary, various, rarely wanting. Ovary of 3-5, rarely more or fewer, carpels either quite distinct or more or less united into a lobed or rarely entire ovary, with a solitary or rarely 2 ovules in each cell; styles as many as carpels, free or united at the base or with their stigmas only. Fruiting carpels either distinct, dry or drupaceous and usually indehiscent, or united in an entire or lobed drupe or capsule. Seeds pendulous, the testa membranous. Albumen abundant, little or none.—Trees or shrubs, with pinnate or simple leaves, usually not gland-dotted. Flowers small, in terminal or more frequently in axillary panicles or racemes.

All species are intensely bitter. The seeds of the central American cedron tree (*Simaba cedron*) form a renowned antidote against snake-bite. The following are all the Burmese species of this order known to me.

\* The carpels quite distinct or only at base connate.

○ Stamens twice as many as petals, rarely more.

Leaves simple	.	.	.	.	.	.	.	.	.	.
Leaves pinnate	.	.	.	.	.	.	.	.	.	.

*Samadera.*  
*Ailanthus.*

○ ○ Stamens as many as petals. Leaves pinnate.

† Disk present.

Disk thick; stamens pilose; flowers panicle . . . . *Picrasma*.

Disk 4-lobed; stamens glabrous; flowers in racemes . . . . *Brucea*.

† † Disk none; flowers in panicles . . . . *Eurycoma*.

\* \* Ovary entire or lobed, 2-5-celled.

Filaments with a basal 2-cleft scale; leaves 1-3-foliolate or pinnate . . . . *Harrisonia*.

Filaments without scale; leaves 2-foliolate . . . . *Balanites*.

## SAMADERA, Gaertn.

Flowers hermaphrodite. Calyx 3-5-parted, glandular outside at the base, imbricate. Petals 3-5, contorted in bud. Disk large, inverted-conical. Stamens 6-10, included, furnished at base with a short scale. Ovary consisting of 4-5 free lobes, each with a solitary suspended ovule; styles united. Drupes 1-5, large, dry, keel-winged. Testa of seeds membranous.—Evergreen trees with simple entire leaves. Flowers rather large, in poor umbels.

1. *S. Indica*, Gaertn.—H.f. Ind. Fl. i. 519; Bedd. Sylv. Madr. 49.—*Kathai*.—A small evergreen tree, all parts glabrous; leaves oblong to elliptically oblong, 8-10 in. long, acute at base, on a rather short petiole, bluntish acuminate; quite entire, coriaceous, glossy and prominently laxly net-veined on both sides; flowers rather large, yellowish, forming poor terminal glabrous long-peduncled umbels; calyx very short, bluntish 4-toothed; petals 4, about an in. long, oblong, blunt, puberulous; stamens 8; ovary 4-lobed; drupes usually solitary, about 2 in. long, glossy, obliquely obovoid, keel-winged, the wing thick and obliquely excurrent at the summit.

HAB.—Upper Tenasserim, tropical forests.—s.

REMARKS.—Yields the niepa bark of commerce.

## AILANTHUS, Desf.

Flowers polygamous. Calyx 5-cleft, imbricate. Petals 5, induplicate valvate. Disk 10-lobed. Stamens 10, in the females none, in the hermaphrodites 2-3, the filaments without basal scale. Ovary 2-5 parted (in the males rudimentary), with a solitary ovule in each cell; styles connate; stigmas feathery. Samaras 1-5, winged all round, chartaceous, 1-seeded. Albumen scanty.—Large trees, with pinnate leaves. Flowers small, in terminal panicles.

1. *A. Malabaricus*, DC.; H.f. Ind. Fl. i. 518; Bedd. Fl. Sylv. t. 122; Brand. For. Fl. 58.—A tree 60-80 ft. high, shedding leaves in H.S., the leaf-buds rusty-tomentose; leaves unpaired-pinnate, 1-2½ ft. long, glabrous; leaflets falcate-lanceolate, oblique at base, shortly petioluled, alternate, acuminate, entire, chartaceous, glabrous;

flowers small, on 2 lin. long tawny puberulous pedicels, racemulose, forming fugaceously puberulous rather large terminal panicles; petals nearly 2 lin. long; samaras  $1\frac{1}{2}$ -2 in. long, oblong, blunt at both ends, veined, brown, 1-seeded in centre.

HAB.—Rather rare in the tropical forests of the Khaboung choung, eastern slopes of Pegu Yomah.—Fr. Apr.—s : l.—SS.=SiS.

REMARKS.—Wood soft, white, said to be useless.—Exudes a reddish gum.

### PICRASMA, Bl.

Flowers dioecious. Calyx minute, 4-5-toothed. Petals 4 or 5, usually enlarging in the females, valvate. Stamens in males as many as petals, inserted round the thick disk, in the females often wanting, the filaments without basal scale. Ovary of 3-5 distinct lobes, raised on the fleshy disk, with a single ovule in each lobe. Drupes 1-3, small, containing a crustaceous or coriaceous 1-seeded nut. Albumen fleshy.—Evergreen trees, with pinnate leaves. Flowers small, greenish, cymose, in axillary panicles.

1. *P. Javanica*, Bl.; H.f. Ind. Fl. i. 520.—An evergreen tree (40—50 + 10—25 + 4—5), all parts glabrous; leaves unpaired-pinnate, 8-9 in. long, the rachis furnished at base with small rotundate stipules; leaflets in 3 pairs with an odd one, oblong or elliptically oblong, on a 2-3 lin. long petiolule, rounded at base, bluntish apiculate, 4-5 in. long, entire, membranous, beneath silky-shining, laxly net-veined; flowers small, greenish-white, in almost trichotomous cyme-like glabrous axillary panicles shorter than the leaves; calyx 4-cleft, the lobes rotundate, almost acute; petals 4, oblong, rather acute, glabrous; drupes usually by 4 or fewer, globular, raised on the flat and thick torus, white, smooth.

HAB.—Frequent in the tropical forests from Martaban down to Tenasserim and the Andamans; rare in those of the Pegu Yomah.—Fl. March; Fr. Begin. of R.S.—s.—SS.=Metam., &c., SiS. (?)

REMARKS.—Wood yellowish-white, amianth-like fibrous, rather light, close-grained, soft, perishable.

### BRUCEA, Mill.

Flowers polygamous. Calyx 4-cleft, imbricate. Petals 4, minute, imbricate. Stamens 4, rudimentary in the males; the filaments glabrous. Disk 4-lobed. Ovary of 4 distinct or almost distinct lobes, each with a single pendulous ovule; styles free or only at base connate. Drupes 4 or fewer, each containing a crustaceous one-seeded nut. Testa of seed membranous. Albumen copious.—Shrubs or trees, with pinnate leaves. Flowers minute, in little cymes forming axillary racemes.

Leaflets coarsely crenate-toothed; drupes about 2 lin. long . . . . *B. Sumatrana*.  
 Leaflets quite entire; drupes about 3-4 lin. long . . . . *B. mollis*.

1. *B. Sumatrana*, Roxb.; H.f. Ind. Fl. i. 521.—A large evergreen shrub, all younger parts softly pubescent; leaves 1-1½ ft. long or longer, unpaired-pinnate; leaflets in 2-3 pairs with an odd one, obtuse and often somewhat oblique at base, ovate-lanceolate, on a short but slender petiolule, 2-2½ in. long, acuminate, coarsely crenate-toothed, densely pubescent or villous, especially beneath; flowers minute, purple, in little cymes or clusters and forming an interrupted tomentose racemes in the axils of the leaves as long or shorter than them; drupes the size of a small pea, glabrous.

HAB.—Tenasserim.

2. *B. mollis*, Wall.; H.f. Ind. Fl. i. 521.—A small simple-stemmed shrub, all younger parts puberulous or pubescent; leaves unpaired-pinnate, the petiole and rachis terete, puberulous and glabrescent; leaflets in 4-6 pairs with an odd one; ovate-oblong or ovate-lanceolate, on a 2-3 lin. long pubescent petiolule, acuminate, quite entire, membranous, above sparingly, beneath more densely pubescent, or (except the pubescent nerves) almost glabrous, 2-3 in. long; flowers minute, green, on slender about a line long pubescent pedicels, forming puberulous or pubescent simple slender racemes in the axils of the leaves and much shorter than them; petals lanceolate, ciliate towards the base; disk green, larger than the sparingly tawny hispid glabrescent ovary; styles broadly linear, deflexed; drupes solitary or by 2, rarely 3, ovate, the size of a large pea or larger.

HAB.—In the drier and damp hill-forests of Martaban and Upper Tenasserim, at 3,000 to 4,000 ft. elevation.—Fl. March.—s.—SS.=Metam.

### EURYCOMA, Jack.

Flowers polygamous. Calyx cup-shaped, 5-toothed, imbricate. Petals 5, induplicate-valvate. Disk none. Stamens 5, almost central in the males, hypogynous in the females; the filaments at the base appendaged at each side. Ovary deeply 5-parted, the 1-ovuled lobes free and sessile; styles united. Drupes 3-5, stalked, beaked, crustaceous, dry, when fully ripe tardily dehiscing along the inner angle. Albumen none.—Trees or shrubs, with unpaired-pinnate leaves. Flowers in ample nearly terminal panicles.

1. *E. longifolia*, Jack.; H.f. Ind. Fl. i. 521.—An evergreen shrub or rather treelet, 7 to 10 ft. high, with the trunk usually simple or prolific at the summit, the younger shoots densely rusty-pubescent; leaves unpaired-pinnate, 2-2½ ft. long, glabrous, the petiole and rachis glossy blackish; leaflets in numerous pairs with an odd one, oblong-lanceolate, almost oblique at base, almost sessile, 3-4 in. long, nearly blunt, coriaceous, entire, beneath silvery-glaucous;

flowers about 2 lin. long, slenderly pedicelled, brownish blood-red, forming densely rusty-glandular axillary panicles at the end of the branches and much shorter than the leaves; calyx glandular-pubescent; petals lanceolate, shortly tomentose or velvety; filaments subulate, scarlet, whitish pilose, at base furnished with 2 oblong yellow sessile glands; ovary-carpels pilose.

HAB.—Lower Tenasserim, in forests; also Andamans.—Fl. Nov.

### HARRISONIA, R. Br.

Flowers hermaphrodite. Calyx 4-5-cleft. Petals 4-5, almost valvate. Disk hemispherical or cup-shaped. Stamens 8-10, alternately shorter; the filaments furnished with a small 2-cleft scale on each side at the base. Ovary globular, entire or 4-5-lobed and 4-5-celled, with a solitary pendulous ovule in each cell; styles connate or free at base. Drupes globular, containing 2-5 perforated 1-seeded nuts. Albumen scanty.—Shrubs or trees, usually prickly armed, with 1-3-foliolate or pinnate leaves. Flowers small, in axillary cymes.

1. *H. Bennetii*, Bth. and H.f.; H.f. Ind. Fl. i. 519.—*Tapoo-pen*.—A tree (15-30+? + 1½-2), leafless in H.S., armed with short straight prickles, all softer parts puberulous; leaves unpaired-pinnate, the puberulous rachis winged; leaflets in 3, rarely 4 pairs, with an odd one, almost sessile, rhomboid-ovate or obliquely ovate-lanceolate, blunt or bluntish-acuminate, 1-1½ in. long, cuneate or acute at base, coarsely crenate or rarely entire, chartaceous, slightly puberulous on both sides, rarely glabrous; flowers rather large, whitish, forming puberulous cymes at the ends of the short lateral branches; petals 5, reddish-white; disk cup-shaped; ovary depressed globular, entire; drupes depressed globular, stylose-apiculate, glabrous.

HAB.—Very frequent in the dry forests of the Prome District; also in Martaban, Yoonzeleen, 2,000 ft.—Fl. Apr.—l.—SS.—CaS., Ca.

### - BALANITES, Del.

Sepals 5, deciduous, imbricate with their margins. Petals 5, imbricate. Stamens 10; the filaments without basal scales. Disk thick, depressed conical or cushion-like. Ovary globular, half-immersed in the disk, 5-celled, with a solitary pendulous ovule in each cell; style short, subulate. Drupe fleshy, oily, containing a bony 5-angular 1-seeded nut. Albumen none.—Shrubs or little trees, spiny armed, with 2-foliolate leaves. Flowers small, cymose.

1. *B. Roxburghii*, Planch ; H.f. Ind. Fl. i. 522 ; Brand. For. Fl. 59.—A leaf-shedding small tree or large shrub, all softer parts shortly greyish pubescent, armed with large straight very sharp solitary spines frequently bearing leaves and flowers, the trunk much crooked, ash-coloured ; leaves 2-foliate, on a very short petiole ; leaflets 1-1½ in. long, shortly petioluled, from oval to oblong, acute at base, blunt, while young shortly tomentose ; flowers rather small, greenish-white, shortly pedicelled, forming rather long-peduncled tomentose cymes ; sepals and petals inside tomentose ; drupes as large as a pullet's egg, 5-grooved, with a smooth light-grey dry epicarp, the hard one-seeded nut imbedded in the exceedingly bitter, soap-like, offensively smelling pulp.

HAB.—In the dry forests of Prome and Ava.—Fl. Apr.—I.

### OCHNACEÆ.

Flowers hermaphrodite. Sepals 4-5, free, usually scarious, imbricate. Petals 5, rarely 4-10, free, deciduous, almost sessile or clawed, imbricate or convolute. Torus never annular or glandular, enlarged under the fruit. Stamens 4-10 or many, equal or unequal, one-sided or declinate ; filaments persistent ; anthers linear, basifix, dehiscing longitudinally or by terminal pores. Ovary central or excentric, 1-10-celled, terete or lobed, with 1 or 2 rarely more ovules in each cell, the placentas various ; style simple, or rarely 2-10-cleft at summit. Fruit either consisting of 3 to 10 one-seeded drupes seated on the enlarged torus, or 2-4-lobed, 1-4-seeded, indehiscent, or berry-like, or septicidally capsular, coriaceous or woody. Albumen fleshy or none.—Trees or shrubs, with simple usually serrulate leaves. Stipules present. Flowers showy, often bright yellow, in panicles or fascicles, rarely solitary.

Bitter principles prevail in this small order. Timber of most species good, but small. The five species below are all that are known from Burma.

Stamens numerous ; inflorescence lateral	. . . . .	<i>Ochna</i> .
Stamens 10 ; panicles terminal	. . . . .	<i>Gomphia</i> .

### OCHNA, Schreb.

Sepals 5, persistent, coloured. Petals 5-10, deciduous. Torus thick, lobed or stalk-like raised. Stamens numerous, the filaments filiform. Ovary deeply 3-10-lobed, with a solitary ovule in each lobe. Drupes 3-10, sessile on the enlarged torus. Seeds erect.—Trees or shrubs, with simple serrulate leaves. Stipules axillary, by pairs. Flowers bright yellow, in lateral panicles or corymbs, rarely solitary or fascicled.

\* *Styles free at the summit*; fruiting sepals erect-conniving. *O. Andamanica*.

\* \* *Styles united along the whole length*.

† Trees.

Petals usually 7-8; filaments almost 4 times shorter than the anthers; fruiting sepals erect-conniving. *O. squarrosa*.

Petals 5; filaments as long or longer than the anthers; fruiting sepals reflexed. *O. Wallichii*.

† † Dwarf shrubs; filaments about as long as the anthers; fruiting sepals erect-connivent.

Bractlets linear, conspicuous; peduncles very long, axillary, 2-3-rarely 1-flowered. *O. pumila*.

Bractlets none; peduncle none or very reduced, usually corymbosely many-flowered. *O. fruticulosa*.

1. *O. Andamanica*, Kz.—A small tree, shedding leaves in H.S., all parts glabrous; leaves oblong or oblong-lanceolate, about 4-5 in. long, shortly petioled, acute and mucronate, bristly or minutely serrulate, chartaceous, glossy above; flowers large and showy, bright yellow, appearing with the young leaves, on rather short but slender afterwards elongating pedicels, jointed with the simple very short peduncles which arise from the end of the lateral leafless branchlets; filaments as long or somewhat longer than the anthers; petals 5, somewhat longer than the sepals, obovate, broadly clawed; sepals of the fruiting calyx all erect-connivent; styles all free at the summit and spreading.

HAB.—Rather frequent in the tropical and moister upper mixed forests of the Andamans.—Fl. March; Fr. May-June.—s.—SS.—SiS. Chloritic rocks, etc.

REMARKS.—Wood pale-brown, heavy, close-grained, but irregularly fibrous, hard and somewhat brittle, the sapwood paler-coloured.

2. *O. Wallichii*, Planch; H.f. Ind. Fl. i. 524 in part.—*Yo-da-yah*.—A tree (30—50 + 10—25 + 3—5) shedding leaves in H.S., all parts glabrous; bark greyish-brown, 3-4 lin. thick, rather smooth or slightly wrinkled; cut reddish, dry; leaves from elliptically oblong to oblong-lanceolate, about 4-5 in. long, shortly petioled, narrowed at base, acuminate, minutely but sharply serrulate, chartaceous, glossy above; flowers appearing with the young leaves, large, bright-yellow, on very long slender pedicels, arising either from very short simple or from longer branched peduncles at the end of the longer or shorter leafless branchlets; petals about 5, about twice as long as the sepals, obovate, narrowed into a broad claw; filaments as long or somewhat longer than the anthers; sepals of the fruiting calyx all reflexed; styles about an inch long, the stigmas depressed-capitate.

HAB.—Very frequent in the tropical forests of Martaban and Tenasserim; less so along the eastern and southern slopes of the Pegu Yomah.—Fl. March; Fr. Apr.-May.—SS.—*Metam.* SiS., Lat. p.

REMARKS.—Wood brown, heavy, close-grained, of a flexuose fibre, brittle.

3. *O. squarrosa*, Roxb.; H.f. Ind. Fl. i. 523 in part only; Bedd. Sylv. Madr. 50, t. 8, f. 3; Brand. For. Fl. 60.—A small

leaf-shedding tree, all parts glabrous; leaves oblong or ovate-oblong, shortly petioled, blunt or acute, sharply serrulate; flowers rather large, corymbose; petals usually 7 to 8, obovate-oblong; filaments almost 4 times shorter than the anthers; styles connate; sepals of the fruiting calyx erect-connivent.

HAB.—Prome; Tenasserim (?)—Fl. H.S.

4. *O. fruticulosa*, Kz.—A stunted dwarf shrub, with strong developed underground trunk, 1 to 3 ft. high, leafless in H.S., all parts glabrous; leaves usually cuneate-oblong or cuneate-lanceolate, about 4-5 in. long, acuminate to almost bluntish, at base narrowed into a very short petiole, chartaceous, sharply serrulate; flowers showy, bright yellow, appearing along with, or before, the young leaves, on longer or shorter pedicels, arising either direct from the short lateral branchlets, or usually from short simple or branched peduncles; petals 5, obovate, clawed; filaments as long as the anthers; style as long or somewhat longer than the sepals, very slender, filiform; stigma minute, truncate; sepals of the fruiting calyx erect connivent.

HAB.—Frequent in the open forests, especially the Eng-forests, all over Pegu and Martaban.—Fl. Apr.-May; Fr. June-July.—I.—SS. = *Dil. Arg.*

### GOMPHIA, Schreb.

Sepals 5, persistent or deciduous, usually coloured. Petals 5, imbricate. Torus thick, lobed or stalk-like. Stamens 10, the filaments very short; anthers opening by pores. Ovary deeply 5-6-parted, the lobes inserted obliquely on the torus, with a solitary ascending ovule in each cell; styles connate. Drupes 5 or fewer by abortion, sessile on the enlarged torus. Seeds erect.—Trees or shrubs, with simple serrate leaves. Stipules usually connate. Flowers yellow or orange-yellow, in terminal panicles.

1. *G. Sumatrana*, Jack.; H.f. Ind. Fl. i. 525.—A little ever-green tree, all parts glabrous; leaves lanceolate to elliptically oblong, shortly petioled, acuminate, bluntish serrate, 3-5 in. long, obtuse or acute at base, chartaceous, glabrous; flowers rather small, deep-yellow, on long slender pedicels, in terminal and axillary short raceme-like panicles arranged in a larger panicle at the end of the branches; sepals about 3 lin. long; torus in fruit large, fleshy, deep-crimson; drupes as large as a pepper-kernel or larger, glabrous.

HAB. — Tenasserim, along the sea-coast.

### BURSERACEÆ.

Flowers hermaphrodite or polygamous, regular. Calyx gamosepalous, or the sepals distinct, imbricate or valvate. Petals 3-5,

usually free, deciduous, valvate or imbricate. Stamens twice as many as petals or more, rarely 3-5, equal or unequal, free; anthers usually versatile. Disk usually conspicuous, annular or cup-shaped. Ovary free, 2-5-celled, with 2 or rarely a solitary usually pendulous ovule in each cell; style usually short, with an entire or 2-5-lobed stigma. Drupe indehiscent, containing 2-5 nuts or a bony or chartaceous stone, the fruit rarely capsular, enclosing 2-5 bony nuts. Seeds pendulous. Albumen none.—Trees or shrubs, with pinnate or rarely 3-1-foliate leaves, the lower pair of leaflets usually stipule-like. Flowers small, in racemes or panicles.

This order contains trees yielding myrrh and frankincense, and all the species abound in fragrant resins. Their timber is usually heavy and durable. All the Burmese species are trees.

Disk covering the whole urceolate calyx-tube, produced into ap.  
 pendaged lobes; calyx large, bell-shaped . . . . . *Garuga*.  
 Disk annular; calyx minute, imbricate, 4-6-parted . . . . . *Bursera*.  
 Disk annular, or consisting of free glands; calyx rather large,  
 valvate, usually 3 (rarely 2-5) -cleft . . . . . *Canarium*.

### GARUGA, Roxb.

Flowers polygamous. Calyx bell-shaped, 5-cleft, valvate. Petals 5, inserted above the middle of the calyx-tube, induplicate-valvate. Disk thin, fleshy, 5-cleft, the lobes closely adhering to the calyx and terminating in a bluntish appendage almost glandular-notched. Stamens 10, free, equal. Ovary 4-5-celled, with 2 ovules in each cell; the style thick with a capitate 4-5-lobed stigma. Drupes fleshy, containing 5 or by abortion 1-3 bony 1-seeded nuts.—Trees, with unpaired-pinnate leaves, the leaflets crenate or serrate. Flowers comparatively rather large, in terminal panicles.

1. *G. pinnata*, Roxb.; H.f. Ind. Fl. i. 528; Bedd. Sylv. Madr. t. 108; Brand. For. Fl. 62, t. 13.—*Chin-yop-pen*.—A tree (70—80 + 40—50 + 6—7), leafless during H.S., all younger parts tomentose; leaves unpaired-pinnate, tomentose or pubescent, often turning glabrous; leaflets in about 9-7 pairs with an odd one, very shortly petioluled or almost sessile, oblong-lanceolate, about 3-5 in. long or longer, acuminate, crenate-serrate; flowers cream-coloured, on slender but short pedicels, forming numerous terminal branched panicles shorter than the leaves; drupes irregularly globose, as large as a cherry, yellowish-green, fleshy, glabrous or pubescent, containing from 1 to 5 one-seeded nuts.

HAB.—Common in the mixed forests all over Burma from Chittagong and Ava down to Tenasserim and the Andamans, up to 3,000 ft. elevation.—Fl. Febr.—March; Fr. Begin. of R.S.—l.—SS.=∞.

REMARKS.—Wood greyish or yellowish, rather heavy, coarsely fibrous, but rather close-grained, takes an indifferent polish, and is not much used. □'=52 pd. Bark good for tanning.—Exudes a gum. The leaves are frequently invested with large red obovate apiculate galls.

## BURSERA, L.

Flowers hermaphrodite or polygamous. Calyx small, 4-6-parted or -lobed, imbricate. Petals as many, valvate or rarely imbricate. Stamens 8-12, nearly equal. Disk annular, crenate. Ovary 3-5-celled, with 2 ovules in each cell; style very short, with a 3-5-lobed stigma. Drupes indehiscent or rarely 2-3-valved, containing usually one, rarely more, one-seeded bony nuts.—Resinous trees, with unpaired leaves. Flowers minute, in axillary panicles or racemes.

1. *B. serrata*, Wall.; H.f. Ind. Fl. i. 580.—*Thadée* pen.—An evergreen tree (50—90 + 30—50 + 8—8), sometimes shedding leaves in H.S., the younger parts pubescent; leaves unpaired-pinnate, pubescent or tomentose while young; leaflets in 3 to 5 pairs with an odd one, on rather long and slender petiolules, bluntish cuspidate, while young usually quite entire, when full grown more or less serrate and quite glabrous; flowers minute, yellowish-green or greenish-white, very shortly pedicelled, forming axillary, solitary, loose and elongate panicles shorter than the leaves; drupes on thickened peduncles, globular, sometimes obscurely 2-3-lobed, as large as a small cherry, red, containing 1 to 3 one-seeded nuts.

HAB.—Frequent in the tropical forests, especially along choungs, of the eastern slopes of the Pegu Yomah and Martaban.—Fl. Apr.—s x l.—SS.—Metam. SIS

REMARKS.—Wood brown, turning red-brown, heavy, close-grained, of a somewhat unequal but fine fibre, tolerably soft, takes fine polish. Good for furniture, &c.

## CANARIUM, L.

Flowers hermaphrodite or polygamous. Calyx urceolate or cup-shaped, 3- (rarely 2- or 5-) cleft, persistent, valvate. Petals 3-4, rarely 5, valvate or slightly imbricate. Stamens 8-10, inserted on the margin or outer side of a fleshy, entire or lobed disk; filaments usually free. Ovary 3- rarely 3-1-celled, with 2 ovules in each cell; stigma sessile. Drupes often somewhat 3-angled, containing a single bony 1-seeded nut. Testa of seed membranous.—Large resinous trees, with unpaired-pinnate leaves, the lower pinnales sometimes stipule-like. Flowers small or middling-sized, in axillary panicles.

\* Stipules subulate, entire, very deciduous.

Leaflets serrulate; disk-glands smooth, free, coherent by pairs . . . . . *C. euphyllum*.  
 Leaflets entire; disk-lobes hairy, united in a cup . . . . . *C. Bengalense*.

\* \* Stipules 2-cleft and pretlutely cut, persistent . . . . . *C. coccineobracteatum*.

1. *C. euphyllum*, Kz.; H.f. Ind. Fl. i. 585.—An evergreen tree (80—90 + 50—60 + 10—14); leaves 2-3 ft. long, unpaired-

pinnate, the rachis striate in a dried state; leaflets oblong or ovate-oblong, opposite, 9-10 in. long, obliquely rounded at base, apiculate, on a  $\frac{3}{4}$  in. long petiolule, chartaceous, serrulate, glossy, glabrous, much net-veined between the 12-19 lateral nerves on each side, the lower leaflets smaller; flowers rather large, white, in short distant racemes, forming  $1\frac{1}{2}$  ft. long quite glabrous axillary panicles shorter than the leaves; calyx 3-cleft, the broad lobes rather blunt; petals 3, lanceolate-acute, rather thick, about  $\frac{1}{2}$  in. long, velvety outside; disk-glands cohering by pairs, elliptical, blunt, yellow; stamens 6, the filaments cohering at the base; style simple.

HAB.—Frequent in the tropical forests of South Andaman.—Fl. June.—s.—SS. = SiS. Chloritic rocks.

2. *C. coccineo-bracteatum*, Kz.; H.f. Ind. Fl. i. 536.—A middling-sized evergreen tree, about 50 ft. high, all younger parts tawny velvety; leaves unpaired-pinnate, 1-2 ft. long, glabrous, the rachis striate, pale tawny-coloured; leaflets 3 to 4 pairs with an odd one, 5-7 in. long, opposite, oblong or ovate-oblong, on a 3-4 lin. long petiolule, unequal at the obtuse base, acuminate, entire and bristly serrulate on the same tree, almost coriaceous, glabrous, laxly net-veined between the 10 lateral nerves on each side beneath; stipules rather large, deeply 2-cleft and cut again into several stiff coarsely-toothed segments, pale puberulous; flowers (in bud) forming axillary crimson velvety panicles at the end of the branches; bracts oblong, acute, velvety, bright red.

HAB.—Rather rare in the tropical forests of South Andaman.—Fl. May.—s.—SS. = SiS.

3. *C. Bengalense*, Roxb.; H.f. Ind. Fl. i. 534.—A lofty evergreen tree, the leaf-buds slightly rusty pubescent; leaves unpaired-pinnate, 1-2 ft. long; leaflets almost opposite, in 6-10 pairs with an odd one, lanceolate to oblong-lanceolate, on a 2-3 lin. long petiolule, acuminate, entire, chartaceous, glabrous, 2-4 in. long; stipules entire, subulate, very caducous; flowers middling-sized, white, shortly pedicelled, forming elongate raceme-like panicles in the axils of the leaves and shorter than them; calyx cup-shaped, and broadly 3-toothed; petals obovate-oblong,  $\frac{1}{2}$  in. long; filaments united half-way in a tube; disk-scales 3, hairy, united in a cup; drupes oblong, the size of a plum, dark purple, pruinous, containing an obscurely 3-cornered 3-celled bony nut.

HAB.—Very rare in the moister upper mixed forests of the Pegu Yomah.—s.—SS. = SiS.

REMARKS.—Wood pale-brown, rather light, coarse-fibrous, but rather close-grained; takes fine polish.—Exudes a clear, brittle, amber-coloured resin resembling copal.

## MELIACEÆ.

Flowers regular, usually hermaphrodite, rarely polygamous, dioecious. Calyx usually small, 4- or 5-lobed, or the sepals distinct, imbricate or very rarely valvate. Petals 4 or 5, rarely 5-7 or 3 only, imbricate, contorted or rarely valvate. Stamens 5-20, usually 8-10; the filaments inserted outside on the disk, more or less united in a tube, very rarely quite free; anthers sessile or rarely stipitate, on the inside or at the summit of the staminal tube, 2-celled, the cells opening longitudinally. Disk various, free or adnate. Ovary 3-5-celled, with usually 2, rarely 1 or 6 or more, ovules in each cell; stigma disk-shaped or pyramidal. Fruit a capsule, berry or drupe, indehiscent or opening loculicidally, rarely septicidally. Albumen fleshy or none. Radicle superior.—Trees or shrubs, with alternate usually pinnate leaves. Stipules none. Flowers usually small, in panicles.

Bitter, astringent, and tonic qualities prevail in the order; hence the bark and root of several species are used as febrifuges. The timber of many is valuable, and satin-wood, mahogany, and toon-wood are the produce of trees belonging to this order. All the species of this order are woody, and are therefore described here.

\* *Stamens united into a tube or cup.*

○ *Ovules 2 or 1. Seeds not winged.*

× *Albumen thin, fleshy. Cotyledons leafy or plano-convex.*

† *Capsule loculicidally 5-valved; calyx-lobes leafy. Manronia.*

† † *Fruit a drupe.*

*Calyx 5-6-parted; drupes containing a single 3-5-celled stone . . . Melia.*

*Calyx 5-toothed; drupes containing 6 cartilaginous pyrenes . . . Cipadessa.*

× × *Albumen none. Cotyledons thick, often conferruinate.*

† *Disk free, tubular or cylindrical; style usually elongate.*

† *Leaves pinnate.*

*Calyx small, toothed, open in bud; seeds without arillus . . . Dysorhylon.*

*Calyx usually bell-shaped, toothed, open in bud; arillus complete or incomplete*

† † *Leaves 3-foliate; calyx tubular . . . Schizochiton.*

† † *Disk none, or annular, stalk-like or confluent with the staminal tube; styles usually short or none.*

† *Anthers included or almost included in the staminal tube.*

*Petal 5; anthers 5-10; berry indehiscent . . . . . Aglaia.*

*Petal 3; anthers 6; capsule loculicidal . . . . . Amora.*

† † *Anthers exserted or the filaments free.*

*Berry indehiscent, or follicular dehiscent, 1-celled; arillus present . . . . . Tatura.*

*Capsule loculicidal; seeds large; arillus none . . . . . Carapa.*

○ ○ *Ovules many. Seeds winged.*

*Disk rather broad; seeds winged at both ends . . . . . Soyimida.*

*Disk none; seeds winged at the lower end only . . . . . Chickrassia.*

\* \* *Stamens free; ovules many; seeds winged . . . . . Cedrela.*

## MUNRONIA, Wight.

Calyx persistent, 5-parted, imbricate, the lobes almost leafy. Petals 5, up to the middle united into a funnel-shaped tube. Staminal tube adnate to the corolla-tube, free upwards, 10-toothed at apex; anthers 10, alternating with the teeth and furnished with a bristly appendage. Disk membranous, sheathing the ovary. Ovary 5-celled, with 2 ovules in each cell; style slender. Capsule 5-lobed, loculicidally 5-valved. Albumen thin.—Small undershrubs or shrubs with 3-foliolate or unpaired-pinnate leaves. Flowers large, white, in poor axillary cymes.

1. *M. Wallichii*, Wight; H.f. Ind. Fl. i. 543.—A small simple-stemmed shrub, up to a foot high, the young shoots pubescent; leaves unpaired-pinnate, the petiole and rachis terete and pubescent; leaflets in 2-3 pairs with an odd one, very shortly petioluled, opposite or almost alternate, ovate-lanceolate to lanceolate, 2-2½ in. long, unequal at base, bluntish acuminate, membranous, entire, puberulous on the nerves beneath; flowers about an in. long, showy, white, pedicelled, forming tawny pubescent cymes in the axils of the upper leaves; calyx pubescent, the lobes about 3 lin. long, oblong-spathulate, somewhat acute; corolla-lobes as long as the tube, pubescent outside, especially along the borders; the teeth of the staminal tube on the back appendaged.

HAB.—On shady moist rocks in the upper mixed forests of the central range of the Pegu Yomah.—Fl. March.-Apr.—s.—SS.= SiS.

## MELIA, L.

Calyx 5-6-parted, imbricate. Petals 5 or 6, free, twisted in bud. Staminal tube almost cylindric, 10- or 12-toothed or cleft, the lobes 2-3-lobed; anthers 10-12, within the summit of the tube. Disk annular. Ovary 3-6-celled, with 2 superposed ovules in each cell; style slender. Drupe containing a 1-5-celled stone. Seeds pendulous. Albumen thin, fleshy.—Trees, with alternate pinnate to decomposed leaves. Flowers often showy, in large axillary panicles.

\* *Leaves simply pinnate.*

Leaflets entire . . . . . *M. excelsa.*

Leaflets serrate; drupes small, by abortion 1-celled and 1-seeded . *M. Azadirachta.*

\* \* *Leaves bipinnate. Drupes 5-celled, some of the cells usually seedless.*

Drupe small, oblong, about ½ in. long; staminal tube blue, slender, glabrous outside, about 3 lin. long; leaflets serrate. . . . .

*M. Azadirach.*

Drupe large, ovate or oblong, about an in. long; staminal tube white, about 1½-2 lin. long, glabrous outside; leaflets crenate or ultimately entire . . . . .

*M. dubia.*

Drupe large, almost globose, about an in. or more thick; staminal tube 2-4 lin. long, white, woolly at the summit; leaflets entire

*M. Birmanica.*

1. *M. excelsa*, Jack in Mal. Misc. i. 12; H.f. Ind. Fl. i. 544.—An evergreen tree, 50 ft. high, glabrous; leaves simply pinnate, crowded at the end of the branchlets, 2-2½ ft. long, the petiole terete thickened and somewhat scaly at the base; leaflets in 7-9 pairs with an odd one, alternate or nearly opposite, ovate-oblong, very oblique and almost auricled at the base, on petiolules 1½-2 lin. long, rather bluntish acuminate, 3-6 in. long, quite entire, glabrous; flowers 2-2½ lin. long, white, on short bracteoid pedicels, forming a large glabrous panicle about as long as the leaves; calyx short with rounded sepals; petals 5, puberous outside; staminal tube 10-furrowed, bluntish, 10-20-toothed, glabrous outside; anthers 10, somewhat exserted; ovary glabrous, the style rather strongly filiform; ovary 3-celled.

HAB.—Tenasserim, Mergui, probably cultivated.—Fl. Decb.

2. *M. Azadirachta*, L.; H.f. Ind. Fl. i. 544; Bedd. Sylv. Madr. t. 13 (14 by mistake).—(*M. Indica*, Brand. For. Fl. 67).—*Thinbow-ta-ma-kha*.—A tree (40—80 + 18—40 + 4—6), shedding leaves in H.S., the very young shoots slightly puberulous; leaves usually unpaired-pinnate, glabrous, the rachis glabrous or slightly puberulous above; leaflets in 7-8 pairs with or without an odd one, opposite or nearly so, falcate-lanceolate, very unequal, very shortly petioluled, about 1½-2 in. long, long acuminate, serrate; flowers small, white, on short puberulous pedicels, forming glabrous raceme-like solitary panicles in the axils of the leaves and shorter than them; calyx minute, glabrous, the lobes rounded; petals glabrous, 1½ lin. long; staminal tube as long as the petals, glabrous outside, puberulous within, somewhat widened at summit; drupes oblong, the size of a large pea or about 5-6 lin. long, oblong, yellowish-green, the stone nearly always 1-celled and 1-seeded.

HAB.—Not unfrequent in the drier forests of Prome, especially on the higher ridges of the Yomah; also Ava.—Fl. March.—l.—SS.—CaS.

REMARKS.—Wood very like mahogany, the sapwood small, rather coarse and whitish, the heart-wood red-brown, close-grained, when old often beautifully mottled, hard and heavy; takes a fine polish, and is durable. Good for cart-wheels and ordinary building purposes, furniture; also fitted for ship-building. Bark bitter and used as a febrifuge. Exudes also a gum.

3. *M. Azedarach*, L.; H.f. Ind. Fl. i. 544; Bedd. Sylv. Madr. t. 14 (13 by mistake); Brand. For. Fl. 68.—*Tha-ma-kha*.—A tree (40—50 + 12—20 + 3—4), leafless during H.S., the shoots usually mealy-puberulous; leaves bipinnate, glabrous when adult, the petiole terete; pinnæ usually in 3-4 pairs, the uppermost ones often 3-foliate; leaflets in 3 to 2 pairs with an odd one, opposite or nearly so, usually obliquely ovate or ovate-oblong, about 1½-2 in. long, very shortly petioluled, while young coarsely serrate, afterwards often only serrulate or entire towards the long acumination; flowers rather

small, white or pale lilac, on slender pedicels, forming solitary more or less puberulous axillary panicles shorter than the leaves; calyx puberulous, the lobes oblong-lanceolate; petals 3-3½ lin. long, minutely puberulous; staminal tube bluish-lilac, slender, about 3 lin. long, glabrous outside, sparingly pilose within, many-cleft at the summit; ovary 5-celled; drupes oblong, the size of a large pea or larger, yellow, the stone obtusely 5-cornered, bony, 5-celled.

HAB.—Prome and Ava, in and around villages, apparently only cultivated; wild in the adjoining Siamese provinces.—Fl. Febr.-March; Fr. March-April.

REMARKS.—Wood pale brown or reddish, striate, rather loose-grained, rather light; takes a fine polish. Good for furniture, but warps and splits.

4. *M. Birmanica*, Kz.—*Taw-tha-ma-kha*.—A tree (40—60 + 12—20 + 3—5), shedding leaves in H.S., all the younger parts greyish or yellowish scurfy-tomentose; bark brownish-grey, about 2 lin. thick, rather even, longitudinally fissured and corky-lenticellate; cut greenish-white; leaves bipinnate, petiole long and terete; pinnæ usually in 5 to 3 pairs; leaflets of the main pinnæ in 5, of those below and above gradually in fewer pairs, ovate or ovate-lanceolate, rounded or acute at base, sometimes somewhat unequal, 1½-2 in. long, shortly acuminate, entire, on short but slender usually puberulous petiolules; flowers greenish-white, rather small, on very short scurfy-tomentose pedicels or almost sessile, forming yellowish or greyish scurfy-tomentose corymbose axillary panicles shorter than the leaves; calyx deeply 5-cleft, the lobes oblong-lanceolate, acute, mealy-puberulous; petals about 3 lin. long, velvety outside, densely puberulous inside; staminal tube only 2 lin. long, white, pilose inside, and at the summit very woolly between the anthers; drupes globose or nearly so, about an in. in diameter or larger, yellowish, smooth, very fleshy, containing an obtusely 5-8-angular and 5-8-celled globular putamen.

HAB.—Frequent in the tropical forests of Martaban.—Fl. March-Apr.; Fr. Apr.-May.—s.—SS.—Metam.

REMARKS.—Sapwood white, of a silvery lustre, rather heavy, coarsely and somewhat unequally fibrous; heart-wood brown, soft.

### CIPADESSA, Bl.

Calyx cup-shaped, 5-toothed. Petals 5, induplicate-valvate. Staminal tube 10-parted, entire at base and united with the disk, the lobes linear or 2-cleft at apex, bearing the 10 anthers between. Disk cupular. Ovary 5-celled, with 2 collateral ovules in each cell; style rather short, club-shaped at summit. Drupe 5-lobed, containing 5 coriaceous 1- or 2-seeded stones. Seeds pendulous. Albumen fleshy.—Shrubs or small trees, with alternate unpaired-pinnate leaves. Flowers minute, paniced.

1. *C. baccifera*, Miq. (*Cip. fruticosa*, Bl. ; H.f. Ind. Fl. i. 545 (*Mallea Rothii*, Juss. ; Bedd. Sylv. Madr. 54, t. 8, f. 5).—A small evergreen tree or shrub, the younger parts puberulous; leaves unpaired-pinnate, the rachis terete; leaflets in 3 to 4 pairs with an odd one, oblong or ovate-oblong, unequal, and more or less oblique, bluntish or sharply acuminate,  $2\frac{1}{2}$ -3 in. long, on short but slender usually puberulous petiolules, entire or coarsely serrate-toothed, glabrous; flowers minute, white, on slender puberulous pedicels, forming long peduncled puberulous or almost glabrous lax panicles in the axils of the leaves and shorter than them; bracts and bractlets all linear; petals lanceolate, acute, about a line long; staminal tube shorter than the petals; the filaments ciliate; drupes globular, the size of a pepper-kernel or small pea, red, glabrous, containing 5 firmly coriaceous one-seeded nuts.

HAB.—Ava.

### DYSOXYLON, Bl.

Flowers hermaphrodite. Calyx 4 or 5-toothed or -cleft, open already in bud. Petals 4 or 5, free, valvate. Staminal tube cylindrical, rarely cornered, shortly 8-10-toothed at summit; anthers as many as teeth, included in the tube. Disk tubular, usually longer than the ovary and sheathing. Ovary 3-5-celled, with 1 rarely 2 ovules in each cell; style slender. Capsule usually irregularly pear-shaped, loculicidally 2-5-valved, the valves bearing the septum in the centre. Arillus none.—Trees, with abruptly or unpaired-pinnate leaves. Flowers in axillary lax panicles.

Calyx, petals, and reproductive organs perfectly glabrous . . . *D. lineatariferum*.  
Calyx, petals, and staminal tube minutely pubescent . . . *D. procerum*.

1. *D. procerum*, Hiern. in H.f. Ind. Fl. i. 547.—An evergreen tree (60—70 + 30—10 + 4—5), the young shoots slightly pubescent; leaves abruptly or unpaired-pinnate, the rachis glabrous; leaflets in 3 to 6 pairs with or without an odd one, shortly petioluled, opposite and alternate, from ovate-oblong to oblong-lanceolate, unequal at the acute base, bluntish acuminate or acute, entire, chartaceous, 5-10 in. long, glabrous; flowers white, middling-sized, on jointed puberulous pedicels, forming axillary solitary glabrous spreading panicles as long or shorter than the leaves; calyx puberulous, cup-shaped, truncate 4-toothed; petals 4, spatulate, blunt; disk tubular, longer than the ovary, densely tawny pubescent inside; staminal tube as long as the style, minutely pubescent, truncate and obscurely 8-toothed at summit, the teeth notched; ovary and style half-way appressed rusty-pubescent; capsules pyriform, the size of the fist, with a thick coriaceous pericarp.

HAB.—Rare in the tropical forests of the southern slopes of the Pegu Yomah; also Tenasserim.—Fl. Dec.—s.—SS.—Lat. p.

2. *D. binectariferum*, Bedd. ; H.f. Ind. Fl. i. 546.—An evergreen tree, 50 to 60 ft. high, the leaf-buds minutely tawny puberulous; leaves abruptly pinnate; the petioles above flat, the rachis, however, acutely produced; leaflets alternate, in 3-4 pairs, obliquely ovate-lanceolate to oblong-lanceolate, unequal at the acute base, on a 3-4 lin. long petiolule, acuminate, 5-6 in. long, thin coriaceous, entire, glabrous; flowers middling-sized, white, shortly pedicelled, forming rather short narrow minutely puberulous panicles in the axils of the leaves; calyx hemispherical, very coriaceous, obsoletely 4-toothed; petals 4, coriaceous, oblong, acute, reflexed when fully open; staminal tube about 2 lin. long, shortly 8-toothed, the teeth notched; disk tubular, a line long; ovary and style-base densely tawny pubescent; capsules globose, pear-shaped, the size of an apple, thick coriaceous, when fully ripe deep yellow, smooth, 4-celled and 4-valved, each cell containing a solitary obovate-oblong seed of the size and shape of a chestnut.

HAB.—Chittagong.—Fl. June; Fr. Febr.

### SCHIZOCHITON, Bl.

Flowers polygamously dioecious. Calyx bell-shaped or urceolate, 4- or rarely 5-toothed, open already in bud. Petals united with the staminal tube into a longer or shorter tube, twisted or valvate. Staminal tube long, cylindrical, 6-8-lobed at summit, the lobes entire; anthers alternating with the lobes, included in the tube. Disk short, sheathing the ovary. Ovary 3-4-celled, with a solitary ovule in each cell; style filiform. Capsule coriaceous, 3-4-celled, opening loculicidally, the valves bearing the septum in the middle. Arillus complete or incomplete.—Trees, with abruptly pinnate leaves. Flowers usually very long and slender, in supra-axillary large panicles.

\* *Flowers almost sessile or very shortly and stoutly pedicelled.*

Leaves quite glabrous . . . . . *Sch. dysoxylifolius.*

Leaves softly pubescent beneath . . . . . *Sch. grandiflorus.*

\* \* *Flowers on slender pedicels. Softer parts pubescent Sch. paniculatus.*

1. *Sch. dysoxylifolius*, Kz. (*Chisogeton dysoxylifolius*, Hiern. in H.f. Ind. Fl. i. 551).—An evergreen tree, all parts glabrous; leaves large, resembling those of *Dysoxylon alliaceum*, abruptly pinnate, glabrous; leaflets alternate, on short thick puberulous petiolules, oblong or oblong-lanceolate, somewhat unequal, acuminate, entire, chartaceous, 10-12 in. long, glabrous; flowers about 6 lin. long, tubular, almost sessile, subtended by a small lanceolate very pubescent bractlet and forming short pubescent racemes arranged in more or less pubescent panicles shorter than the leaves; calyx bell-shaped, obsoletely 4-toothed, minutely pubescent; petals about 6

lin. long, obovate-linear, puberulous; staminal tube as long as the style, from the middle adnate to the petals, appressed yellowish pubescent outside, 6-cleft at the summit, the lobes oblong, blunt, glabrous; anthers 6, alternating with the lobes; ovary and style up to the middle appressed pubescent.

HAB.—Tenasserim.—Fl. March.

2. *Sch. grandiflorus*, Kz. (*Chisogeton grandiflorus*, Hiern. in H.f. Ind. Fl. i. 551).—An evergreen tree (40—50 + 18—30 + 3—4), all softer parts softly and shortly pubescent; bark about  $\frac{1}{4}$  in. thick, rough from corky warts; cut rather dry, reddish; leaves abruptly pinnate with an abortive process between the last pair of leaflets, or unpaired-pinnate, the rachis densely tawny pubescent; leaflets in 4 to 6 pairs, sometimes with an odd one, opposite or nearly so, on a short thick tomentose petiolule, oblong or oblong-lanceolate, shortly acuminate, entire or nearly so, 6-8 in. long, above (with the exception of the midrib and nerves) glabrescent, beneath softly pubescent; flowers about 6 lin. long, almost sessile, and subtended by a broadly oblong densely tawny pubescent bractlet and forming short dense racemes arranged in a long-peduncled densely tawny tomentose slender axillary panicle shorter than the leaves; calyx bell-shaped, densely pubescent, obsoletely 4-toothed; petals about 6 lin. long, densely pubescent, the tips imbricate; staminal tube towards the base adnate to the petals, slightly pubescent, 6-7-crenate-lobed at summit, the lobes truncate-oblong, alternating with as many anthers; ovary and style tawny pubescent; capsules 3-lobed and pear-shaped, about  $1\frac{1}{2}$  in. long, with a thick coriaceous yellow pericarp, 3-valved; seeds large, enveloped in a complete arillus.

HAB.—Frequent in the tropical forests of Martaban and Tenasserim.—Fr. March-Apr.—s.—SS.—Metam.

REMARKS.—Wood pale-brown, heavy, irregularly coarse-fibrous, but close-grained, rather hard.

3. *Sch. paniculatus*, Hiern.; H.f. Ind. Fl. i. 552.—An evergreen tree, all softer parts pubescent; leaves unpaired-pinnate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  ft. long, the rachis terete, pubescent; leaflets in 6-12 pairs with an odd one, somewhat obliquely oblong or ovate-oblong, on short tawny tomentose petiolules, opposite or nearly so, chartaceous, 4 to 10 in. long, pubescent beneath, more or less glabrescent except on the nerves; flowers small, 4-merous, on slender about 1-2 lin. long pedicels, cymulose, and forming ample elongate tawny pubescent panicles in the axils of the leaves and usually longer than them; calyx obsoletely 4-toothed, small; petals about  $\frac{1}{2}$  in. long or somewhat longer, puberulous; staminal tube more or less pubescent, bluntish, 6-8-lobed, the lobes deeply 2-cleft; style pubescent

towards the base; capsules globose-pear-shaped, the size of a wood-apple, velvety, orange-red, 4-valved.

HAB.—Ava and Pegu (P)

### SANDORICUM, Cav.

Calyx cup- or almost bell-shaped, shortly 5-lobed, the tube adnate to the base of the ovary. Petals 5, free, imbricate. Staminal tube cylindrical, 10-toothed at the summit; anthers 10, included in the tube. Disk tubular, 5-toothed, sheathing the ovary and style-base. Ovary immersed in the calyx-base, 5-celled, with 2 pendulous ovules in each cell; style columnar, club-shaped and annular upwards. Berry fleshy, indehiscent, 3- to 5-celled, the septa absorbed during maturation. Seeds solitary, arillate.—Trees, with 3-foliolate leaves. Flowers solitary or clustered, in axillary panicles.

1. *S. Indicum*, Cav.; H.f. Ind. Fl. i. 553; Bedd. Sylv. Madr. 55.—*Thit-to*.—An evergreen tree (50—60 + 20—30 + 6—7), all softer parts pubescent; bark grey, even, roughish and minutely wrinkled; leaves pinnately 3-foliolate, on a softly pubescent long petiole; leaflets broadly ovate to ovate-oblong, 5-8 in. long, acuminate, entire, membranous, especially along the nerves puberulous, more or less glabrescent, the lateral ones on a very short, the terminal one on an 1-2 in. long pubescent petiolule; flowers rather small, yellow, very shortly pedicelled, subtended by a linear membranous bractlet, in short dense clusters, forming a narrow tomentose axillary panicle shorter than the leaves; calyx tomentose; petals minutely pubescent; staminal tube about 4 times longer than the nearly 10-toothed tubular disk, the latter sheathing the ovary and style-base; berries almost globose, the size of a lime, slightly tomentose, yellow, filled with a fleshy acid edible pulp, by maceration 1-celled; arillus replete with tough woolly fibres; seeds brown, glossy, with a spongy testa.

HAB.—In the tropical forests of the southern slopes of the Pegu Yonah and Tenasserim; much cultivated in Burmese villages.—Fl. Jan.; Fr. Apr.-May.—s.—SS.—Metam. Lat. p.

REMARKS.—Wood dark, brownish-grey, hard and heavy. Employed for carts, boat-building, etc.

### AGLAIA, Lour.

Flowers polygamously dioecious. Calyx 5-toothed or -cleft, imbricate. Petals 5, free or united at base, imbricate. Staminal tube urceolate or almost globose, entire or 5-toothed at the summit; anthers 5, included in the tube or half-exserted. Disk inconspicuous. Ovary 1-3-celled, with 1 or 2 ovules in each cell; style

short and thick. . Berry coriaceous or almost succulent, indehiscent. Seeds with a sappy arillus.—Trees, with pinnate or digitate or rarely 3-1-foliate leaves. Flowers minute, almost globular, in axillary panicles.

\* *Calyx, pedicels, panicle, and often also all other softer parts, more or less scaly.*

× Leaflets usually in 2 pairs with an odd one, nearly glabrous.

Scales of the younger parts and of the small sessile panicle pale-coloured . . . . . *A. Andamanica*.

Scales of the younger parts and of the ample peduncled panicle rusty brown . . . . . *A. paniculata*.

× × Leaflets pinnately 3-foliate . . . . . *A. Chittagonga*.

× × × Leaflets usually in 8 to 5 pairs with an odd one, beneath densely silvery or coppery scaly.

Panicle ample, densely silvery or coppery scaly; flowers sessile . . . *A. argentea*.

\* *Calyx, pedicels, and usually the whole inflorescence rusty-puberulous or tomentose from stellate hairs.*

Leaves very large, leaflets in 8 or more pairs, the lateral nerves all very sharply prominent; panicles, etc., rusty-puberulous; flowers pedicelled . . . . . *A. crassinervia*.

Leaflets in 6-7 pairs; the petioles, inflorescence, and berries rusty-tomentose . . . . . *A. Griffithii*.

\* \* *Calyx and pedicels glabrous.*

Leaflets in 1 or 2 pairs, sometimes solitary; panicles slightly stellately pubescent, soon glabrous . . . . . *A. oligophylla*.

1. *A. Andamanica*, Hiern. in H.f. Ind. Fl. i. 555.—An evergreen tree (30—40+8—15+2—4), the young shoots sparingly covered with coarse pale coloured scales; leaves unpaired-pinnate, while young sprinkled with pale-coloured or silvery scales, soon quite or almost quite glabrous, the rachis indistinctly scaly; leaflets usually in 2 pairs with an odd one, on slender scaly petiolules about 3-4 lin. long, especially at the acute base somewhat oblique, ovate to ovate-oblong, shortly and bluntish acuminate, 3-5 in. long, coriaceous, the lateral nerves beneath thin, but sharply prominent, without veins or net-veination; fruiting panicles short and robust, sessile, covered with a dense indistinctly scaly and pale-coloured tomentum; ripe berries  $1\frac{1}{2}$  in. long, ellipsoid, minutely scaly, crimson, very shortly and thick peduncled.

HAB.—Not unfrequent in the tropical forests of the Andamans.—Fr. Febr.

2. *A. Chittagonga*, Miq.—An evergreen tree (30—40+15-20+3—4), the softer and younger parts silvery scaly and more or less glabrescent; leaves pinnately 3-foliate, the petiole scaly and more or less glabrescent; leaflets opposite or nearly so, on densely scaly 2-4 lin. long, strong petiolules, oblong to elliptically oblong, apiculate or shortly acuminate, coriaceous, 4-7 in. long, opaque, glabrous above, beneath sprinkled with silvery scales; flowers unknown; berries (unripe) obovoid, the size of a cherry, densely silvery or glivous-scaly, on short stout peduncles, forming a poor robust pale-

scaly panicle in the axils of the leaves of about the length of the petiole or somewhat longer.

HAB.—In the tropical forests of Chittagong and Arracan.—s.—SS.—SiS.

2. *A. paniculata*, Kz.—A middling-sized evergreen tree, the young shoots clothed with a dark-brown or coppery scaly down, soon glabrescent; leaves unpaired-pinnate, glabrous, the rachis terete, minutely rusty, scaly, and glabrescent; leaflets usually in 2 pairs with an odd one, almost opposite, ovate to ovate-oblong, on a rusty scaly 2-2½ lin. long petiolule, bluntish and abruptly acuminate, 4-9 in. long, coriaceous, glabrous and opaque, the end leaflets ternary or pinnately remote; flowers minute, on short rusty-scaly slender pedicels, forming ample rusty-scaly tomentose panicles in the axils of the leaves and as long or somewhat shorter than them; calyx rusty-scaly, the lobes broad and blunt; petals ½ a line long, free; anthers 5; berries unknown.

HAB.—Not unfrequent in the tropical forests of the Pegu Yomah; Tenasserim.—Fl. March.

3. *A. argentea*, Bl.—A small evergreen tree, all parts silvery or-coppery lepidote; leaves large, unpaired-pinnate, 2-2½ ft. long, the petiole and rachis densely lepidote; leaflets opposite or nearly so, in 5 to 8 pairs with an odd one, from lanceolate and ovate to elliptically lanceolate, on a short thick petiolule, unequal at base, acuminate, from ½ to 1½ ft. long, thin coriaceous, glabrous above, beneath densely silvery lepidote, the lateral nerves strong and numerous; flowers sessile, minute, forming ample axillary densely lepidote-tomentose panicles; calyx 5-lobed, densely pubescent; petals 5, elliptically oblong, blunt, glabrous; staminal tube 5-toothed, the teeth blunt; ovary minutely hairy; berries obovoid, while young lepidote, glabrescent, 1-2-seeded.

HAB.—Rare in the tropical forests of the eastern slopes of the Pegu Yomah, west of Tounghoo.—s.—SS.—SiS.

4. *A. crassinervia*, Kz.; H.f. Ind. Fl. i. 556.—An evergreen tree, the shoots probably scaly; leaves large, unpaired-pinnate; the rachis terete, minutely rusty puberulous; leaflets in 4 or more pairs with an odd one, linear-oblong or oblong-lanceolate, almost opposite or alternate, on a 2-3 lin. long thick petiolule, 6-10 in. long, acuminate, entire, glabrous above, beneath densely and minutely scaly tomentose, more or less glabrescent, the lateral nerves all parallel and numerous, very sharply prominent; flowers minute, on short rusty puberulous pedicels, forming large rusty puberulous panicles in the axils of the leaves.

HAB.—Tenasserim.

5. *A. Griffithii*, Kz.—A small evergreen tree, all the younger parts densely rusty pubescent; leaves unpaired-pinnate; the rachis

densely rusty-tomentose; leaflets in 7-4 pairs with an odd one, on a short but slender rusty pubescent petiolule, linear-lanceolate or lanceolate, acuminate, waved, glabrous above, beneath sprinkled with a rusty minute tomentum and densely rusty-tomentose along the midrib and the lateral nerves, the end-leaflets usually ternary; flowers yellowish, minute, on short rusty-tomentose pedicels, forming densely rusty-tomentose lax shortly peduncled panicles in the axils of the leaves; calyx tomentose; the lobes ovate, acute; petals about a line long; anthers 5; berries globose, the size of a cherry, minutely stellately velvety, 1-seeded.

HAB.—Tenasserim.

6. *A. oligophylla*, Miq.—An evergreen tree, the young shoots scurfy-puberulous or almost tomentose; leaves unpaired-pinnate, rarely 2-1-foliate, the rachis short, puberulous, soon glabrescent; leaflets in 1 or 2 pairs with an odd one, or reduced to fewer, obovate-oblong to oblong-lanceolate, on a rather short thickened glabrous petiolule, acute at base, 3-1½ in. long, bluntish acuminate, glabrous, laxly net-veined on both sides; flowers minute, yellow, on short but slender glabrous pedicels, forming slightly hairy and a little scaly but soon glabrescent panicles in the axils of the leaves and shorter than them; calyx-segments rotundate, blunt, glabrous, obsolete ciliate.

HAB.—Tenasserim.

### AMOORA, Roxb.

Flowers polygamously dioecious. Calyx cup-shaped, 3-5-toothed, usually bracted. Petals 3, imbricate. Staminal tube almost globular, obscurely 6-10-crenate or entire; anthers 6-10, included in the tube. Disk none. Ovary 3-5-celled, with 1 or 2 superposed ovules in each cell; style elongate or none. Capsule coriaceous, 3-5-celled, loculicidally opening in 3 to 5 valves, the valves bearing the septum on the middle. Seeds arillate.—Trees, with unpaired-pinnate leaves. Flowers small, the males in axillary panicles, the females often in axillary spikes or racemes.

\* *Petals* 3. *Anthers* 6-8.

× Flowers sessile, spiked, the male spikes paniced.

Leaflets shortly acuminate; male flowers about 4 lin. in diameter. *A. Rohituka*.

× × Flowers pedicelled, cymose-paniced.

○ Panicles ample, as long to half as long as the leaves.

Leaflets shortly acuminate, thin coriaceous, the nerves prominent. *A. spectabilis*.

Leaflets blunt, coriaceous, the nerves above obsolete. *A. cucullata*.

○ ○ Panicles slender, as long or shorter than the petiole; panicle very lax, slender, densely scaly *A. lactescens*.

\*\* *Petals* 5; *stamens* 10; panicles short, densely scaly. *A. dysosyloides*.

1. *A. Rohituka*, WA.; H.f. and Th. Ind. Fl. i. 559; Bedd. Fl. Sylv. t. 132; Brand. For. Fl. 69.—*Thit-nee*.—An evergreen tree

(50—60+20—30+4—5), the shoots puberulous; bark about 3 lin. thick, brownish-grey, corky-eracked, oblong-squared; cut red; leaves unpaired-pinnate, glabrous, the terete rachis often puberulous and glabrescent; leaves in 5 to 8 pairs with an odd one, opposite, rather shortly petioluled, oblong or linear-oblong, somewhat unequal at base, 3-5 in. to about a foot long, shortly and bluntish acuminate, entire, thin coriaceous, glabrous or sometimes puberulous along the midrib; flowers greenish or pale-yellow, sessile or nearly so, about 4 lin. in diameter, the males forming spikes arranged in glabrous axillary panicles, the hermaphrodite ones in simple many-flowered axillary often puberulous spikes; petals 3, oval; staminal tube globular, fleshy, entire, the 6 anthers included and almost sessile; ovary 3-celled; capsules globose, about  $1\frac{1}{4}$ — $1\frac{1}{2}$  in. thick, while young puberulous, rather fleshy-coriaceous, opening into 3 valves; seeds rather large, oblong, completely enclosed in the fleshy scarlet arillus.

HAB.—Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and from Martaban down to Tenasserim, up to 3,000 ft. elevation.—Fr. Apr.-May.—s. SS. = Metam. SiS. Lat. p.

REMARKS.—Wood white, turning pale-brown, the heartwood darker coloured, rather heavy, streaked, rather coarse-fibrous, but close-grained, takes a fine polish. □=80 pd. Adapted for house-building. Seeds yield an oil.

2. *A. cucullata*, Roxb.; H.f. Ind. Fl. i. 560.; Bedd. Sylv. Madr. 55.—*Thit-nce*.—An evergreen middling-sized tree, all parts glabrous; leaves unpaired-pinnate, glabrous; leaflets in 3 to 4 pairs with an odd one, opposite, shortly petioluled, obliquely ovate-lanceolate, blunt, entire, thin coriaceous; flowers small, yellow, the males about 2 lin. in diameter, on rather short thick pedicels, forming drooping branched sparingly scaly axillary panicles of about the length of the leaves, the hermaphrodite ones by 3-6 in a short thick axillary spike; petals 3, oval, concave; staminal tube turbinate, fleshy, slightly 3-toothed at the summit, the 6-8 oblong anthers sessile, included; ovary 3-celled; capsules nearly globose, obtusely 3-lobed, as large as a middling-sized apple, toughly fleshy-coriaceous, 3-valved; seeds large, roundish, 3-angular, covered for  $\frac{2}{3}$  by a fleshy bright orange-coloured arillus.

HAB.—Forests of Lower Pegu and Tenasserim.—Fl.-Sept.—s.

REMARKS.—Wood brown, rather hard and strong, but not heavy. Adapted for house-building.

3. *A. spectabilis*, Miq.; H.f. Ind. Fl. i. 561.—An evergreen tree, the leaf-buds and young shoots indistinctly tawny puberulous; leaves unpaired-pinnate,  $1\frac{1}{2}$ –2 ft. long, on a minutely tawny puberulous glabrescent petiole  $\frac{1}{2}$ – $1\frac{1}{4}$  ft. long; leaflets in 5-6 pairs with an odd one, almost-opposite, on 2-3 lin. long petiolules; oblong to ovate-oblong, shortly and rather abruptly acuminate,  $3\frac{1}{2}$ –5 in. long,

rather thin coriaceous, glabrous, the lateral nerves numerous, and, like the veins and net-veination, conspicuous on both sides; male flowers shortly pedicelled, racemulose or almost cymulose, forming an ample short-peduncled minutely tawny puberulous glabrous panicle in the axils of the leaves and usually shorter than them; calyx minute, 3-lobed, tawny puberulous; petals 3, a line long, almost glabrous; staminal tube urceolate, shortly and bluntish 8-toothed; anthers usually 8; fruits obovoid, the size of a wood-apple, shortly and stoutly peduncled, minutely ochraceous-tomentose.

HAB.—Pegu, Rangoon.

4. *A. lactescens*, Kz.—An evergreen tree (30—40+10—15 + 3—4), the young shoots covered with pale-coloured scales; bark nearly 2 lin. thick, brown, even, covered with minute lentils; cut pale coloured, milky; leaves unpaired-pinnate, the rachis terete, minutely scaly, but soon glabrescent; leaflets in 3-2 pairs with an odd one, alternate, oblong to lanceolate-oblong, on 2-3 lin. long petiolules, oblique at the acute base, acuminate, chartaceous, green, glabrous, 3-5 in. long, the nerves and veination, especially above, conspicuous; flowers pretty large, on curved silvery-lepidote slender pedicels 1-1½ lin. long, forming a lax sessile slender slightly branched densely scaly panicle in the axils of the leaves and shorter than the petiole; calyx densely scaly; petals 3, about a line long or longer, glabrous, concave-rotundate; anthers 6; fruit obovoid-globular, while young scurfy scaly, the size of a cherry.

HAB.—Rather rare in the tropical forests of Martaban.—s.—SS.—Metam.

5. *A. dysoxyloides*, Kz.—An evergreen middling-sized tree, the younger parts greyish scaly; leaves unpaired-pinnate, about a foot long, the rachis, petiole, and midrib beneath densely greyish scaly; leaflets in 3 pairs with an odd one, alternate, oblong, obliquely acute at the base, on scaly 2-3 lin. long petiolules, 4-5 in. long, rather abruptly and bluntish acuminate, thin coriaceous, nigrescent, opaque, beneath sprinkled with minute silvery scales; flowers small, on short, thick, scaly pedicels, forming a robust but small densely greyish or gilvous scaly sessile panicle in the axils of the leaves much shorter than the petiole; calyx short, thickly scaly, 5-toothed; petals 5, hardly a line long, obovate-oblong, glabrous; staminal tube glabrous; anthers 10; ovary ovoid, pale hirsute; stigma sessile, large, glabrous.

HAB.—Martaban.

### WALSURA, Roxb.

Calyx 4-5-cleft, imbricate. Petals 4 or 5, free, imbricate or almost valvate. Staminal tube deeply 8-10-cleft, the lobes linear-subulate or 2-cleft, or the filaments all free; anthers exserted. Disk annular, fleshy. Ovary 2-3-celled, immersed in the disk, with

2-ovules in each cell; style short. Berry fleshy or coriaceous, indehiscent or bivalvar-dehiscing, one-celled and 1-seeded. Seeds enclosed in a fleshy arillus.—Trees, with unpaired-pinnate or 3-1-foliolate leaves. Flowers small, in axillary and terminal panicles.

\* *Berries indehiscent, usually velvety or tomentose.*

○ Inflorescence densely pubescent; berries densely tomentose . . . . . *W. villosa.*

○ ○ Inflorescence minutely puberulous; leaves and petioles glabrous.

Leaves beneath usually white-areolate within the net-veination; filaments broadly lanceolate, sprinkled with minute hairs . . . . . *W. robusta.*

Leaflets uniformly glaucous beneath; filaments linear, densely pubescent; flowers larger . . . . . *W. hypoleuca.*

As former, but leaflets very thin chartaceous and net-veination very faint . . . . . *W. oxycarpa.*

\*\* *Berries follicular-dehiscing, usually quite glabrous.*

Leaves and inflorescence quite glabrous . . . . . *W. trijagar.*

Leaves beneath and inflorescence softly pubescent . . . . . *W. pubescens.*

1. *W. villosa*, Wa.; H.f. Ind. Fl. i. 564.—*Gyo-bo*.—A tree (30—50 + 15—25 + 3—4), often remaining stunted, shedding leaves in H.S., the younger parts all densely pubescent; bark about  $\frac{1}{2}$  in. thick, blackish grey, longitudinally fissured; cut red; leaves unpaired pinnate, the young rachis more or less pubescent; leaflets in 2 pairs with an odd one, obovate-oblong, oblong or ovate-oblong, usually blunt or almost notched, rarely bluntish or shortly acuminate, rounded or acute at base, on a 2 lin. to  $\frac{1}{2}$  an in. long petiole, entire, coriaceous, 3-5 in. long, above glabrous or slightly pubescent along the midrib, beneath, especially while young, slightly pubescent along the nerves or rarely the whole undersurface slightly puberulous; flowers small, greenish-yellow, on short tomentose pedicels, forming corymbose almost sessile or shortly peduncled densely tawny pubescent panicles in the axils of the upper-leaves; calyx densely and shortly pubescent, the lobes broadly oblong, acute; petals oblong, pubescent; filaments flat, entire, very broad towards the base, and here slightly cohering, sparingly pilose; berries oblong, indehiscent, the size of a small plum, leathery, densely and shortly tawny tomentose.

HAB.—Frequent in the Eng and low forests from Pegu and Martaban down to Tenasserim; also Ava.—Fl. March-Apr.; Fr. May-June.—l.—SS.== Lat. Dil.

REMARKS.—Wood brown, heavy, coarse, fibrous, but close-grained, rather hard.

2. *W. robusta*, Roxb.; H.f. Ind. Fl. i. 565.—*Gyo-pho*.—An evergreen tree (40—60 + 10—25 + 3—5), the younger shoots minutely greyish puberulous; bark about 2 lin. thick, grey, covered with small corky lentils, soon peeling off in thin irregularly 4-sided pieces; cut dry, red; leaves quite glabrous, unpaired-pinnate, the rachis sprinkled with pale lentils; leaflets in 2 pairs with an odd

one, ovate-oblong and oblong to oblong-lanceolate, on a 4-5 lin. (the terminal one on a 1-1½ in.) long petiolule, 3-5 in. long, long and bluntish acuminate or cuspidate, rounded or acuminate at base, glabrous, chartaceous, beneath marked with white dots on the areoles between the net-veination; flowers small, white, on very short puberulous pedicels, forming rather long-peduncled minutely greyish puberulous glabrescent corymbose panicles in the axils of the leaves and shorter than them; calyx shortly pubescent, the lobes oblong, blunt; petals oblong, acute, puberulous; filaments all free, broad and flat, sprinkled with short hairs; berries elliptical or globular, the size of a cherry, greyish velvety, indehiscent, containing a single seed completely enclosed in the arillus.

HAB.—In the tropical forests of the eastern slopes of the Pegu Yomah, rather rare, but frequent in those of Martaban down to Tenasserim and the Andamans.—Fl. May; Fr. July.—s.—SS.—Metam. Lat. p. SiS. etc.

3. *W. hypoleuca*, Kz.; H.f. Ind. Fl. i. 564.—An evergreen tree (40—50 + 2 + 4—5), the younger shoots minutely puberulous; leaves unpaired-pinnate, quite glabrous, the rachis smooth or with a few lentils; leaflets in 2 pairs with an odd one, elliptically or lanceolate-oblong, on an in. (the terminal one on a 2-2½ in.) long or shorter glabrous petiolule, 6-8 in. long, obtuse or acute at base, chartaceous, bluntish and shortly or long-acuminate, glabrous, very glaucous beneath, but without whitish areoles; flowers rather small, white, on 1-2 lin. long puberulous pedicels, forming sessile or almost sessile puberulous corymbose panicles in the axils of the leaves and shorter than them; calyx puberulous, the lobes oblong, bluntish; petals 5, occasionally increased to 8, linear-lanceolate, acute, puberulous, nearly 2 lin. long; stamens 10, sometimes as many as 15, all free the filaments linear, narrower than the anthers, and equally broad, entire, villous; disk thick, red; ovary immersed, densely tawny tomentose; unripe berries oblong, acuminate, greyish-velvety.

HAB.—Frequent in the tropical forests of South Andaman.—Fl. May-June.—s.—SS.—SiS., chloritic rocks.

4. *W. oxycarpa*, Kz.—An evergreen tree (40—50 + 10—18 + 4—6), the leaf-buds tawny puberulous; leaves unpaired-pinnate; the petiole and rachis sparingly lenticelled, glabrous, slender; leaflets in 2 pairs with an odd one, on ½-¾ in. long slender petiolules, lanceolate to oblong-lanceolate, 3-4½ in. long, thin chartaceous, rather long-acuminate, beneath uniformly glaucescent, the net-veination very thin and inconspicuous; fruiting panicles very slender and long peduncled, poorly branched, glabrous, shorter than the leaves; unripe fruits ovate-oblong, ½ in. long, greyish-velvety, acuminate.

HAB.—Not infrequent in the tropical forests of the Andamans.—s.—SS.—SiS. Metam.

5. *W. trijuga*, Kz. (*Heynea trijuga*, Roxb.; H.f. Ind. Fl. i. 565; Brand. For. Fl. 70; *Heynea affinis*, Juss.; Bedd. Sylv. Mad. t. 134).—Apparently an evergreen tree, the young shoots pubescent; leaves unpaired-pinnate, the rachis terete and glabrous; leaflets usually in 5 pairs, but often varying from 3 to 6 pairs, with an odd one, ovate or lanceolate-oblong, on a short glabrous petiolule, acute or obtuse at base, acuminate, membranous, entire, quite glabrous, glaucous beneath; flowers small, white, on short but slender, glabrous or puberulous pedicels, forming brachiate, glabrous, corymbose, long-peduncled panicles in the axils of the leaves and sometimes longer than them; calyx glabrous; petals puberulous; filaments slightly cohering in a tube, 2-cleft at the apex, slightly puberulous; capsules elliptical or almost globose, the size of a small cherry, glabrous, opening in two leathery valves, containing a single seed enveloped in the (white?) arillus.

HAB.—Tenasserim.—Fl. March.

6. *W. pubescens*, Kz.—An evergreen tree (25—30 + 8—10 + 1—3), all softer parts softly pubescent; bark a line thick, even, greenish-black, beset with rusty-coloured lenticels; leaves unpaired-pinnate, the terete rachis pubescent; leaflets in 4 pairs with an odd one, on a shorter or longer pubescent petiolule, ovate-oblong or oblong, sometimes somewhat unequal at the acute or rounded base, 3-5 in. long, shortly acuminate, entire and usually waved, membranous, softly yellowish pubescent beneath; flowers small, white, on short pubescent pedicels, forming long-peduncled pubescent brachiate corymbose panicles in the axils of the leaves and often longer than them; calyx pubescent; petals about a line long, pubescent outside; staminal tube cleft to about the middle; the filaments broad, quite glabrous, 2-cleft at the summit; berries globose or nearly so, the size of a very small cherry, glabrous, red, opening into 2 leathery valves, containing a single seed enveloped in a white arillus.

HAB.—Rather rare in the tropical forests along the eastern slopes of the Pegu Yomah and in the Martaban hills, up to 2,000 ft. elevation.—Fl. Feb.—March; Fr. Apr.—s.—SS.—SiS. Metam.

REMARKS.—Wood soft, white.

### CARAPA, Aubl.

Calyx 4- or 5-cleft or -parted, imbricate. Petals 4 or 5, free, imbricate. Staminal tube urceolate, 8-10-toothed or -cleft, the lobes entire or 2-parted; anthers included in the tube and alter-

nating with the teeth or lobes. Disk thick, hemispherical. Ovary 4-5-celled, each cell with 2 to 6 ovules superposed in 2 rows; style short. Capsule fleshy or woody, 1-5-celled (the thin septa often obliterating), 2-5-seeded. Seeds large, packed round the remains of the central axis, convex-angular, the testa spongy. Arillus none.—Trees, with abruptly or unpaired-pinnate leaves. Flowers usually in poor axillary panicles.

Flowers about 2 lin. across, 5-merous; leaflets in 2-3 pairs, more or

less ovate, shortly bluntish acuminate . . . . . *C. moluccensis*.

Leaflets obovate to obovate-oblong in 2-1 pairs or solitary, retuse or rounded; flowers about 4 lin. in diameter, 4-merous . . . . . *C. obovata*.

1. *C. moluccensis*, Lamk.—*Peng-lay-oang*.—A small evergreen tree, all parts glabrous; leaves abruptly or spuriously unpaired-pinnate, the rachis terete; leaflets in 2 or 3 pairs, ovate or ovate-oblong, usually a little oblique, bluntish or shortly bluntish acuminate, chartaceous (somewhat fleshy when fresh), very shortly petioluled, entire, glabrous; flowers small, about 2 lin. in diameter, on slender glabrous pedicels, forming slender lax panicles in the axils of the leaves and often as long as them; calyx 5-cleft, the lobes rotundate, acute; petals 5, nearly  $1\frac{1}{2}$  line long; staminal tube about  $1\frac{1}{2}$  lin. long, crenate; capsules the size of a small lime or smaller, globose, containing 2 or 3 large angular seeds.

HAB.—Not unfrequent along the rocky and sandy shores of the Andamans, especially along the western side.—Fr. Apr.-May.—l.—SS. = Sal.

2. *C. obovata*, Bl. (*C. moluccensis*, Bedd. Sylv. Madr. t. 136.) —*Peng-lay-oang*.—An evergreen tree (25—40 + 8—20 + 4—6), all parts glabrous; leaves abruptly pinnate, or occasionally simple, the smooth rachis brown or red; leaflets in 2 or a single pair, rarely the one or other solitary, obovate to obovate-oblong, narrowed at base, very shortly petioluled, rounded or retuse at the apex, 3-4 in. long, entire, fleshy-coriaceous when fresh, glossy on both sides; flowers rather small, nearly 4 lin. in diameter, on 3-4 lin. long thick pedicels, forming meagre short glabrous panicles or racemes in the axils of the leaves and shorter than them; calyx 4-cleft, the lobes rotundate; petals 4, about 2 lin. long; staminal tube 8-lobed; capsules globose, as large as a small shaddok or smaller, apiculate, containing 5 to 6 very large angular brown seeds.

HAB.—Frequent in the littoral forests, especially the tidal ones, all along the shores from Chittagong down to Tenasserim and the Andamans.—Fl. June-July; Fr. Apr.-May.—l.—SS. = Sal.

REMARKS.—Wood pale or dark reddish-brown, broadly streaked, not very close-grained, rather heavy, strong.  $\square = 47$  pd. Good for handles of tools, hand-spikes, helves, spokes, &c., also for house-posts. The fruits used for tanning. Exudes a clear brownish brittle resin.

## CHICKRASSIA, A. Juss.

Calyx eup-shaped, 4- or 5-toothed. Petals 4 or 5, imbricate. Staminal tube cylindrical, 8- or 10-crenate; anthers erect, inserted at the summit of the teeth. Disk none. Ovary shortly stalked, 3-celled with many biseriate ovules in each cell. Capsules woody, septicidally opening in three 2-lamellate valves separating from the 3-winged central axis. Seeds many, imbricate, winged below, compressed.—Large trees, with abruptly pinnate leaves. Flowers middling-sized, in terminal panicles.

Leaves and inflorescences glabrous; capsules greyish, wrinkled-rough . . . . .

*Ch. tabularis.*

All softer parts and inflorescences softly pubescent; capsules black, almost smooth . . . . .

*Ch. velutina.*

1. *Ch. tabularis*, A. Juss.; H.f. Ind. Fl. i. 568; Bedd. Sylv. Madr. t. 11.—*Yeng-ma* or *taw-yeng-ma*.—An evergreen tree (50—90 + 30—50 + 5—8), the young shoots slightly puberulous; leaves unpaired or spuriously abruptly pinnate, 1-2 ft. long, glabrous; leaflets alternate or nearly so, in 4 to 10 pairs, on a slender but rather short petiolule, obliquely ovate to ovate-oblong, long-acuminate, increasing upwards in size from 2 or 3 to 5 in. long, entire, membranous, glabrous; flowers middling-sized, greenish-white, on 1-2 lin. long minutely puberulous pedicels, forming minutely puberulous soon glabrescent terminal panicles; calyx puberulous, hardly a line deep; petals nearly  $\frac{1}{2}$  in. long, ovate-linear, indistinctly puberulous; ovary elongate, sparingly appressed tawny pubescent; the style very short; capsules oval, somewhat pointed, wrinkled-rough, the size of a pullet's egg, greyish-brown.

HAB.—Rather rare in the tropical forests of Chittagong and Pegu down to Tenasserim; also Andamans.—Fl. Sept.—s.—SS. = SiS.

REMARKS.—Wood light-coloured, close-grained, elegantly veined, employed for furniture of various kinds. Usually called Chittagong wood. □' = 24 pd.

2. *Ch. velutina*, Roemer.—*Yeng-ma* or *yimma*.—A leaf-shedding tree (50—90 + 30—40 + 5—8), all softer parts softly pubescent; leaves 1-2 ft. long, softly pubescent, unpaired-pinnate; leaflets alternate, in 5-10 pairs with an odd one, oblong-lanceolate, rather oblique, shortly petioluled or almost sessile, 3-5 in. long, long-acuminate, chartaceous, entire, softly pubescent on both sides, more-so beneath; flowers middling-sized, on tawny or rusty villous pedicels a line long, forming ample lax tawny tomentose panicles; calyx about  $\frac{1}{2}$  lin. deep, tawny tomentose; petals about  $\frac{1}{4}$  in. long, obovate-oblong, minutely velvety; ovary shorter than the style, densely tawny pubescent; capsules ovoid or almost globular, black and almost smooth, the size of a pigeon's egg, somewhat pointed.

HAB.—Frequent in the dry forests and entering also the upper mixed forests of Promo and Pegu; also Ava.—Fl. Sept.—1.—SS.—CaS. SiS. (P)

### SOYMIDA, A. Juss.

Sepals 5, imbricate. Petals as many, twisted in bud. Staminal tube short, cup-shaped, 10-lobed, the lobes 2-toothed, anthers sessile between the teeth. Disk flat. Ovary 5-celled, with numerous pendulous biseriato ovules in each cell; style short. Capsule woody, septicidally opening into 5 bilamellate valves separating from the 5-cornered septum-bearing axis. Seeds pendulous, imbricate in 2 rows, compressed, marginate, at both ends produced into unequally long wings.—Trees, with abruptly pinnate leaves. Flowers small, in axillary and terminal panicles.

1. *S. febrifuga*, A. Juss.; H.f. Ind. Fl. i. 567; Bedd. Fl. Sylv. t. 8; Brand. For. Fl. 71.—A leaf-shedding tree (40—50 + 17—20 + 3½—5), all parts glabrous; leaves abruptly pinnate with a rather terete petiole and rachis; leaflets in 3-5 pairs, opposite, elliptical to elliptically ovate, on a petiole hardly a lin. long or almost sessile with an acute base, 2½-4 in. long, blunt or emarginate, rarely almost acute, chartaceous, glabrous; flowers small, greenish-white, on slender but short pedicels, forming glabrous ample panicles at the end of the branches and in the axils of the upper-leaves; petals about 2 lin. long; capsules ovate, 1-1½ in. long, glabrous.

HAB.—Found by Dr. Brandis somewhere in Burma, probably in Promo.—Fl. March-Apr.; Fr. Jul.-Aug.

### CEDRELA, L.

Calyx 5-cleft or 5-sepalled. Petals 5, imbricate, contorted or rarely valvate at base. Disk thick, or raised and columnar, 4-6-lobed. Stamens free, 4-6, inserted on the summit of the disk, sometimes alternating with as many staminodes; anthers versatile. Ovary 5-celled, with 8-12 biseriato pendulous ovules in each cell; style filiform. Capsule 5-celled, septicidally opening into valves, leaving the dissepiments attached to the persistent axis. Seeds compressed, imbricate, winged below or on both ends.—Trees, with unpaired-pinnate leaves. Flowers small, paniced.

× Leaflets entire (seeds winged at both ends).

Leaflets usually on long slender petiolules; calyx minute, the sepals rounded

. *C. Toona*.

Leaflets usually shortly petioluled; calyx large, the sepals 1½ lin. long, rather acute

. *C. multijuga*.

×× Leaflets serrate or serrulate; calyx minute; seeds winged only below

. *C. serrata*.

1. *C. Toona*, Roxb.; Bedd. Fl. Sylv. t. 10; Brand. For. Fl. 72, t. 14.—*Thit-kadoc*.—A tree (80—100 + 40—50 + 6—12), shedding

leaves in H.S., all parts glabrous; bark greyish-brown, about  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, rather even, coarsely fibrous within; cut red; leaves unpaired-pinnate, glabrous; leaflets in 6 to 12 (sometimes increased to as many as 17) pairs, opposite or nearly so, on a rather long and slender petiolule, obliquely ovate-lanceolate or ovate-oblong, about 3-4 in. long, acuminate or cuspidate, more or less waved or entire, membranous, while very young puberulous on the nerves beneath; flowers small, white, slenderly pedicelled, forming large terminal glabrous panicles of about the length of the leaves or shorter; calyx glabrous, the lobes hardly  $\frac{1}{2}$  a lin. long, rotundate, blunt, ciliolate; petals about 3 lin. long; filaments puberulous, inserted in the cavities on the outside of the very thick pilose red lobes of the disk; capsules as large as a bean or somewhat larger, oblong, blunt, glabrous, 5-valved; seeds broadly winged at both ends and less so on the outer margin.

HAB.—In the tropical forests of the Pegu Yomah, rather rare, common in those of Martaban.—Fl. March-Apr.; Fr. Oct.-Nov.—s.—SS.—SiS. *Mtiam*.

REMARKS.—Wood reddish, turning soon reddish-brown, with a silvery lustre, soft, fibrous, coarse, but rather close-grained. □'=28 pd.—Good for furniture, house-building, etc. Exudes an aromatic resin.

2. *C. multijuga*, Kz.—*Toung-da-ma*.—An evergreen tree (70—90 + 40—60 + 6—8), the trunk conspicuously buttressed at base, the young shoots minutely tawny puberulous; leaves up to 3 ft. long, unpaired-pinnate, the terete petioles and the 2-3 lin. long petiolules puberulous while young; leaflets in 12-15 pairs with an odd one, alternating, from ovate to oblong-lanceolate, somewhat oblique, unequal at base and rounded on one side, acuminate, 5-6 in. long, membranous, entire; flowers small, white, on  $\frac{1}{2}$  a line long pedicels, racemose, forming glabrous contracted panicles; petals and sepals 5 each, ureolate-converging, oblong-lanceolate, rather acute, the latter  $1\frac{1}{2}$  to nearly 2 lin. long, minutely ciliolate; stamens 10, free; ovary with 10 furrows.

HAB.—Rather rare in the tropical forests of the eastern slopes of the Pegu Yomah, west of Toung-hoo.—Fl. March.—s.—SS.—SiS.

3. *C. serrata*, Royle; Brand. For. Fl. 73.—A tree, all parts glabrous, or the young shoots minutely puberulous; leaves unpaired-pinnate, while young puberulous, soon glabrous; leaflets in 10-15 pairs, ovate- to oblong-lanceolate, on short but slender petiolules, especially at the unequal base more or less oblique, finely acuminate, serrate or serrulate, 3-4 in. long, membranous, glabrous, glaucous beneath; flowers small, white, on a lin. long pedicels, forming ample, glabrous, pendulous panicles; petals about 2 lin. long; capsules about an in. long, smooth; seeds broadly winged at one extremity only.

HAB.—Ava.

## CHAILLETIACEÆ.

Flowers hermaphrodite or unisexual. Sepals 5, united or free, imbricate, sometimes unequal. Petals 5, free and equal, or connate and unequal, 2-cleft or 2-lobed. Stamens 5, alternating with the petals and adnate to their base, alternating with as many hypogynous glands or disk-lobes. Ovary free, 2-3-celled, with paired pendulous ovules in each cell; styles 2-3, free or united high up; stigma simple or capitate. Drupe dry or leathery, indehiscent or dehiscent, containing a 1-2-celled bony or crustaceous sometimes 2-parted stone. Seeds solitary, pendulous, with a broad hilum. Albumen none. Embryo large, with a small superior radicle.—Little trees or shrubs, with simple alternate leaves. Stipules usually petiolar. Flowers small, in axillary cymes or corymbs, the peduncle sometimes adnate to the petiole.

## CHAILLETIA, DC.

Flowers regular or nearly so, sometimes polygamous or dioecious. Calyx 5-parted. Petals 5, free, broadly clawed, 2-parted or 2-lobed at the inflexed apex. Stamens 5, equal. Hypogynous glands 5, distinct or united. Ovary 2-3-celled; styles free or connate. Drupe coriaceous, dry, with a 1-2-celled stone.—Little trees or shrubs, with entire leaves. Stipules deciduous. Flowers small, in axillary cymes or corymbs.

X Nerves and net-veination beneath more or less conspicuous.

Cymes cluster-like and almost sessile; leaves green, cuneately narrowed in a very short petiole

*Ch. gelonioides*.

Cymes spreading, peduncled; (?) leaves dark-brown in a dried state

*Ch. mucropetala*.

XX Nerves and net-veination beneath very faint and almost impressed

Cymes on 2-3 lin. long peduncles; leaves brown in a dried state, shortly petioled

*Ch. Helferiana*.

1. *Ch. Helferiana*, Kz.—An evergreen shrub or tree, (?) the younger shoots shortly yellowish or greyish pubescent; leaves elliptically oblong or oblong, on a 3-4 lin. long greyish pubescent petiole, acute or obtuse at base, shortly acuminate, entire, chartaceous, especially while young appressed pubescent along the midrib beneath and along the margins, the lateral nerves thin and inconspicuous; flowers small, on short greyish pubescent pedicels, forming a greyish pubescent small cyme on a  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, thick, free peduncle arising from the axils of the leaves and about 2-4 times longer than the petiole; sepals and petals silky pubescent outside.

HAB.—Tonasserim.

2. *Ch. gelonioides*, H.f. Ind. Fl. i. 570.—An evergreen small tree, the young shoots puberulous; leaves elliptically to obovate-

lanceolate, narrowed into a very short petiole, abruptly to caudate-acuminate, 2-4 in. long, chartaceous, while young silky pubescent beneath, soon glabrous; flowers about 2 lin. in diameter, in small axillary cymes; sepals almost equal, blunt, appressed greyish pubescent; petals as long as the sepals, narrowly obovate, with a basal almost 4-sided scale, glabrous; anthers with a broad connective, in the females without pollen; drupe didymously and broadly oblong, somewhat compressed, about  $\frac{3}{4}$  to 1 in. long, 2 or by abortion 1-celled, velvety.

HAB.—Chittagong.

3. *Ch. macropetala*, Turcz.; H.f. Ind. Fl. i. 571.—An evergreen shrub or tree, the branchlets pustular, the young shoots tawny pubescent; leaves elliptical to elliptically lanceolate, very shortly petioled, acuminate, silk-hairy beneath and on the nerves above, 3-4½ in. long, thin coriaceous; flowers about 2 lin. in diameter, in densely tomentose cymes; sepals united into a turbinate tube, unequal, blunt, appressed greyish pubescent; petals somewhat longer than the sepals (in the females twice as large), split to below the middle; stamens as long as the petals; the anthers in the females without pollen; scales of the disk 4-sided, crenate; ovary in the males rudimentary, in the females globular, white-hairy, the style long and slender, 3-cleft at the apex.

HAB.—Tenasserim.

### OLACINÆÆ.

Flowers regular, hermaphrodite, or rarely unisexual. Calyx small, 4-6-toothed, free or adnate to the disk. Petals 4-6, free or more or less united, valvate. Stamens as many or twice as many as (rarely fewer than) petals, adnate to the base of the petals or free and hypogynous; anthers 2-celled, versatile or rarely adnate. Disk free, or adnate to the ovary or to the calyx, rarely divided into scale-like glands. Ovary free or immersed in the disk, 1- or imperfectly 2-3-celled, with 2-3 or rarely a solitary pendulous ovule in each cell; style simple. Fruit usually an indehiscent drupe, either superior or (through the enlargement of the disk and calyx-tube) inferior. Seeds solitary, pendulous, or spuriously erect. Albumen present or none. Radicle superior.—Trees or shrubs, sometimes scandent, with usually alternate simple leaves. Stipules none. Flowers few and axillary, or in spikes or rarely in terminal panicles.

About 25 species are found in Burma, but little is known of their uses or timber. Nearly all are woody and find a place here.

\* *Stamens twice as many as petals (rarely fewer), or if of the same number, opposite to them.*

○ *Ovary often 2-3-celled at base, at least at the summit 1-celled. Placenta central, with 2 or 3 pendulous ovules.*

- X Stamens twice as many as petals, or, if fewer, accompanied by staminodes.  
 Calyx not enlarging after flowering; stamens all perfect . . . *Ximenia*.  
 Calyx enlarged in fruit; perfect stamens 3-5; staminodes 6 or fewer. . . . . *Olar*.  
 X X Stamens as many as petals and opposite to them. Staminodes none.  
 † Fruiting calyx much enlarged, adnate to the drupe.  
 Ovary 1-celled; scandent tendril-bearing shrub with 3-nerved leaves . . . *Erythralium*.  
 Ovary to near the summit 3-5-celled; trees with penninerved leaves . . . *Strombosia*.  
 † † Calyx in fruit unchanged; disk in fruit much enlarged, adnate to the drupe and resembling an adnate calyx . . . *Anacolosia*.  
 OO Ovary 1-celled, with a single ovule. Flowers hermaphrodite.  
 X Corolla gamopetalous. Inflorescence without bracts.  
 Stamens 4, alternating with as many hypogynous scales or glands . . . *Cassipourea*.  
 Stamens 4, free; staminodes or scales none . . . *Natsiatopsis*.  
 X X Petals free. Inflorescences while young imbricate-bracted.  
 Filaments filiform . . . *Opillia*.  
 \* \* Stamens as many as petals and alternating with them.  
 O Trees or erect shrubs. Cotyledons small or dilated.  
 † Calyx minutely toothed or lobed. Petals usually glabrous.  
 Drupes without fleshy appendage; anthers pendulous . . . *Stemonurus*.  
 Drupes with a fleshy puffy sarcocarp, covering only one-half of the boat-shaped nut; anthers attached to the back above the 2-lobed base . . . *Apodytes*.  
 Drupe berry-like; flowers sessile, in heads . . . *Daphniphylopsis*.  
 † † Calyx 6-cleft, or the sepals distinct, imbricate.  
 Albumen many-lobed; drupes dry, woody . . . *Gonocaryum*.  
 O O Climbers. Cotyledons broadly foliaceous or thick-fleshy. Flowers dioecious.  
 Female flowers in heads; filaments longer than the anthers; drupes villous or echinate; albumen slightly wrinkled . . . *Phytocrene*.  
 Flowers interruptedly spicate; filaments longer than the anthers.  
 Albumen none . . . *Sarcostigma*.  
 Flowers racemose; filaments very short; albumen fleshy . . . *Natsiatum*.  
 Flowers cymose-panicled; filaments very short; albumen fleshy . . . *Iodes*.

### XIMENIA, L.

Calyx 4-5-toothed or -lobed, not enlarging after flowering. Petals 4 or 5, bearded inside, valvate. Stamens twice as many as petals; filaments filiform; anthers dehiscing by opposite slits. Ovary 3-celled at base, with 3 ovules suspended from a central placenta. Drupes with a very thick fleshy sarcocarp. Seeds spuriously erect.—Shrubs or rarely trees, often spinose. Flowers middling-sized, solitary, or in small axillary cymes.

1. *X. Americana*, L.; H.f. Ind. Fl. i. 574.—*Pin-lay-see* or *pin-lai-koo-yiu*.—A straggling shrub, all parts glabrous, armed with

straight spines (reduced branchlets); leaves ovate or ovate-oblong,  $1\frac{1}{2}$ -2 in. long, rather long petioled, acute at base, blunt, entire, glabrous; flowers whitish, rather large, forming little nodding cymes, rarely solitary or by 2 3; petals 3-4 lin. long, densely and long bearded inside; drupes oval-oblong, about an in. long or longer, red, smooth, edible, containing a large not very hard nut.

HAB.—Not unfrequent along the rocky coast of the Andamans; also Tenasserim.

## OLAX, L.

Calyx truncate, enlarging after flowering, and more or less enclosing the fruit. Petals 6, rarely 5, inserted to the free turbinate disk. Perfect stamens usually 3, alternate with the petals, the remaining 7-9 reduced to simple or 2-cleft staminodes. Ovary half-immersed in the disk, 3-celled only at base, with 3 ovules suspended from the central placenta; style more or less elongate. Drupes free, enclosed in the enlarged coriaceous or membranous calyx. Seed spuriously erect. Albumen fleshy.—Trees or shrubs, usually scandent, with alternate entire leaves. Flowers small, in axillary short racemes or spikelets, rarely solitary.

× Enlarged calyx in fruit membranous, dry.

Branchlets terete, together with the leaves beneath and the racemes, puberulous

All parts, also the racemes, quite glabrous; branchlets cornered . . . *O. scandens.*

× × Enlarged fruiting calyx coriaceous; branchlets terete; flowers 4-5 lin. long. . . . . *O. Zeylanica.*

. . . . . *O. imbricata.*

1. *O. scandens*, Roxb.; H.f. Ind. Fl. i. 575; Brand. For. Fl. 75.—*Joung-lai-loo* or *lai-loo*.—A large scandent shrub, with scattered spines on the old stems, all the younger parts pubescent or puberulous, the branchlets terete; leaves oval or oblong, rather shortly petioled, blunt or bluntish apiculate, about 2-3 in. long, entire, more or less puberulous beneath, glabrescent; flowers small, white, shortly pedicelled, forming short axillary solitary puberulous racemes much shorter than the leaves; petals usually 5, rarely 6, half-way united by pairs by means of the adnate filaments so as to resemble 3 two-cleft petals, about 3-4 lin. long; staminodes 2-cleft at apex, glabrous; drupes almost globose or ellipsoid, the size of a large pea, enclosed in the membranous cup-shaped enlarged free calyx, apiculate, 1-seeded.

HAB.—Rather frequent all over Burma from Ava and Chittagong down to Tenasserim, in all deciduous forests, ascending also into the pine forests up to 3,500 ft. elevation.—Fl. Decb.-March.—1.—SS.= ∞ Sal.

2. *O. Zeylanica*, L.; H.f. Ind. Fl. i. 576; Bedd. Sylv. Madr. 60.—A large shrub, all parts glabrous, the branchlets angular while young, when adult marked by 2 sharp lines; leaves ovate-lanceolate, shortly petioled, 3-4 in. long, acute or obtuse at base, acuminate.

nate, revolutely marginate, glabrous, often blackish-dotted beneath, the nerves and veins conspicuous; flowers small, white, on rather slender pedicels, forming short axillary glabrous racemes; petals about 2 lin. long; staminodes 2-cleft at apex; drupes the size of a pea, for more than one-half uncovered by the enlarged, cup-shaped, free, membranous calyx, apiculate, 1-seeded.

HAB.—Ava.

3. *O. imbricata*, Roxb.; H.f. Ind. Fl. i. 575.—A large arboreous climber, all parts glabrous, the branchlets terete; leaves oblong or ovate-oblong, 4-5 in. long, obtuse at base, on short strong petioles, acute, entire, coriaceous, glossy above, the nerves conspicuous beneath; flowers rather large, white, forming short, dense racemes in the axils of the leaves; petals 4-5 lin. long; filaments glabrous; staminodes 2-cleft at apex; drupes oval, perfectly enclosed in the globose, fleshy, when dry, leathery calyx of the size of a small cherry.

HAB.—Chittagong; Tenasserim.—Fr. Febr.

### ERYTHROPALUM, Bl.

Calyx bell-shaped, enlarging after flowering, adnate at base, 5-cleft, the lobes short, almost imbricate. Petals 5, minute and scale-like, inserted below the alternating calyx-lobes. Stamens 5, inserted to the calyx-tube, alternating with the petals; filaments short; anthers erect, with a thick connective. Ovary half-immersed in the disk, 1-celled, containing 2-3 pendulous ovules; style very short; drupes quite enclosed in, and adnate to, the enlarged calyx, at apex marked by the scars of the calyx-limb, containing a crustaceous 1-seeded nut. Seed pendulous. Albumen fleshy. —Scandent glabrous shrubs, with 3-nerved entire leaves. Flowers small, cymose, some of the peduncles transformed into tendrils.

1. *E. scandens*, Bl.; H.f. Ind. Fl. i. 578.—A large woody scandent shrub, all parts glabrous; leaves ovate to ovate-oblong, about 4-6 in. long, almost peltate, long-petioled, 3-nerved at base, acuminate or acute, entire, glabrous, beneath glaucescent, the nerves in adult leaves conspicuous; flowers minute, on slender pedicels, yellowish-green, forming slender long-peduncled 2-cleft cymes in the axils of the leaves; calyx conspicuous, with 5 reflexed sepals; petals minute, semi-orbicular, fringed, white; drupes ellipsoid-oblong, stalked, crustaceous, glabrous, the size of a small plum, crowned by the scars of the calyx-limb.

HAB.—Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah and from Martaban down to Tenasserim.—Fl. Apr.—s.—SS. = *Metam.* SIS.

## STROMBOSIA, Bl.

Calyx very shortly adnate, 5-cleft, almost imbricate, enlarging after flowering. Petals 5, valvate. Stamens 5, adnate to the petals and opposite to them; anthers dorsifix. Ovary half-immersed in the disk or resting on the same with a broad base, nearly to the summit 3-5-celled, containing 3-5 ovules suspended from the central placenta; style short. Drupes berry-like, formed by the enlarged calyx and containing a crustaceous or hard nut. Seeds suspended. Albumen fleshy.

1. *S. Javanica*, Bl.; H.f. Ind. Fl. i. 579.—A large evergreen tree, all parts glabrous; leaves oblong to ovate-oblong, 6-8 in. long, on a rather long and thick petiole, obtuse or rounded at base, acuminate, entire, coriaceous, somewhat glossy above; flowers small, greenish, forming little cymes in the axils of the leaves and much shorter than the petioles; drupes almost turbinate, the size of a plum, truncate and encircled with a prominent margin at the top, terminating in a pointed disk.

HAB.—Tenasserim.

## ANACOLOSA, Bl.

Calyx minute, obscurely toothed, free, remaining unchanged and not enlarging. Petals 6, inserted on the margin of the disk. Disk adnate to the ovary, enlarging and adnate to the fruit. Stamens 6, inserted at the base of the petals and opposite to them; anthers adnate at the inner side, penicellate at tip. Ovary immersed in the disk, 1-celled or imperfectly septate, containing 2-3 pendulous ovules. Drupes berry-like, marked by the annular border of the adnate disk, and containing a crustaceous nut. Seed pendulous. Albumen fleshy.—Shrubs or small trees, with entire coriaceous leaves. Flowers small, cymose.

Calyx and pedicels densely puberulous; drupe scarlet, thinly velvety

Calyx and slender pedicels glabrous : : : : : *A. puberula*.

As preceding, but the fruiting pedicels very thick; drupe an in.

long, glabrous : : : : : *A. crassipes*.

1. *A. puberula*, Kz.; H.f. Ind. Fl. i. 581.—An evergreen tree (30—40+10—18+4—5), all parts glabrous; leaves oblong or ovate-oblong, 6-5 in. long, shortly petioled, acute at base, acuminate to bluntish, entire, coriaceous, glabrous; flowers small, on short straight puberulous pedicels arising from a conical or hemispherical short thick minutely bracted reduced peduncle in the axils of the leaves; calyx tawny puberulous; fruits obovoid, about  $\frac{3}{4}$  in. long, scarlet, minutely velvety.

HAB.—Rather frequent in the tropical forests of the Andamans.—Fl. Apr.-May.—s.—SS.=SiS., Metam.

2. *A. Griffithii*, Mast. in H.f. Ind. Fl. i. 580.—An evergreen shrub or tree(?) all parts glabrous; leaves oblong-lanceolate, 2-3 in. long, on a rather long petiole, obtuse or acute at base, blunt or bluntish acuminate, entire, coriaceous, glabrous, glossy above; flowers small, on straight, short, glabrous pedicels, forming an almost sessile short cyme in the axils of the leaves; calyx glabrous.

HAB.—Tenasserim.

3. *A. crassipes* (*Gomphandra crassipes*, Mast. in H.f. Ind. Fl. i. 587).—An evergreen tree (25—30+8—12+1—2), all parts glabrous; leaves lanceolate to oblong-lanceolate, acuminate at the base, on a thick petiole 4-5 lin. long, rather blunt, 5-7 in. long, thin coriaceous, glabrous, opaque, dark-coloured beneath; flowers small, on a line long pedicels, collected in very short glabrous few-flowered cymes of the length of the petiole; calyx coriaceous, cup-shaped, obsoletely toothed; unripe drupe obovate, on a very thick peduncle only 2-3 lin. long, at the base supported by the ruptured narrow calyx-limb, truncate at the top and terminated by a prominent acuminate disk.

HAB.—Rare in the tropical forests along choungs of the eastern slopes of the Pegu Yomah.—s.—SS.=SiS.

### CANSJERA, Juss.

Flowers hermaphrodite. Calyx very minute and often undistinguishable at the base of the tubular or urceolate 4-lobed corolla. Stamens 4, more or less adhering to the base of the corolla and opposite to its lobes; filaments filiform; anthers almost globular-didymous. Disk 4-lobed. Ovary 1-celled, with a solitary ovule on a short central placenta; style filiform; stigma almost capitate. Drupes with a thin sarcocarp, containing a crustaceous nut. Seed erect.—Scandent shrubs, with alternate entire leaves. Flowers small, in nude spikes.

× Leaves puberulous, retuse or blunt, small . . . *C. parvifolia*.

× × Leaves glabrous.

Leaves oblong-lanceolate, acuminate, opaque; drupes oblong . . . *C. Rheedii*.

Leaves ovate-oblong, acute, glossy above; drupes globular . . . *C. zizyphifolia*.

1. *C. parvifolia*, Kz.; H.f. Ind. Fl. i. 583.—Shrub, (?) all softer parts shortly pubescent or puberulous from forked hairs; leaves usually less than an in. long, ovate, rounded or obtuse at base, notched or blunt, coriaceous, entire, on a short shortly tomentose petiole, on both sides shortly pubescent; flowers small, sessile, form-

ing short spikes in the axils of the leaves; calyx more distinct than in other species; corolla puberulous.

HAB.—Tenasserim.

2. *C. Rheedei*, Gmel.; H.f. Ind. Fl. i. 582; Brand. For. Fl. 75; Bedd. Sylv. Madr. 179, t. 26, f. 6.—A scandent shrub, the younger branches puberulous; leaves from ovate to elliptically oblong, 4-5 in. long, shortly petioled, obtuse at base, acuminate, entire or somewhat waved, almost coriaceous, glabrous, opaque on both sides; flowers small, yellow, tubular, forming about an in. long tomentose spikes in the axils of the leaves; disk-lobes oblong-lanceolate, somewhat lacerate; drupes oblong, the size of a small pea, red, shortly pointed, glossy.

HAB.—Not unfrequent in the tropical forests of the Andamans and Tenasserim.—Fl. May.

3. *C. zizyphifolia*, Griff.—A scandent shrub, the shoots velvety; leaves ovate or ovate-oblong, 2-2½ in. long, on a short often puberulous petiole, obtuse at base, acute or shortly acuminate, entire, coriaceous, glabrous, glossy above, often 3-nerved shortly above the base and the nerves more arcuate; flowers small, green, subtended by a small bract, sessile, forming short velvety spikes in the axils of the leaves; corolla urceolate, papillose outside; disk-lobes from a broad cordate base lanceolate; drupes globular, red.

HAB.—Burma (probably Tenasserim).

## NATSIATOPSIS, Kz.

Flowers dioecious, in elongate racemes. Calyx distinct, 4-toothed; corolla tubular, 4-cleft at the apex. Stamens 4; filaments broadly linear, flat, free. Ovary-rudiment tawny hispid.—Twining undershrubs, with leaves not unlike those of a *Thunbergia*. Flowers small, in elongate axillary fascicled racemes.

1. *N. thunbergiæfolia*, Kz.—A twining shrub, all softer parts minutely scabrous-pubescent; leaves cordate at the base, ovate-oblong, 5-6 in. long, very long petioled, shortly acuminate, repand-toothed, chartaceous, rough above, beneath densely pubescent, 7-nerved at the base; male flowers very shortly pedicelled, about 2 lin. long, forming elongate simple shortly tomentose racemes arising by 2 or 3 from above the axils of the leaves; calyx distinctly 4-cleft, pubescent; corolla gamopetalous, tubular, 4-lobed; the lobes short, reflexed, appressed pubescent outside; stamens 4; filaments long, broad-linear, free; ovary-rudiment densely tawny-hispid.

HAB.—Ava, Khakyen hills.—Fl. March.

## OPILIA, Roxb.

Calyx minute, 4-5 toothed, not changed after flowering. Petals 4-5, hypogynous, valvate. Stamens as many, opposite to the petals; filaments filiform; anthers dorsifix near base. Disk of 4-5 scales. Ovary 1-celled with a solitary suspended ovule; style short. Drupe with a crustaceous nut. Seed spuriously erect. Albumen present.—Scandent shrubs, with entire almost distichous leaves. Flowers minute, by 1 to 3 subtended by a bract, forming axillary racemes, catkin-like while young.

1. *O. amentacea*, Roxb.; H.f. Ind. Fl. i. 583; Bedd. Sylv. Madr. 60, t. 9, f. 3.—A large scandent shrub, all parts glabrous; leaves ovate-lanceolate to lanceolate, on a 2-3 lin. long petiole, 3-4 in. long, bluntish acuminate, entire, coriaceous, glossy above, glabrous; racemes short, solitary, or by 2 or 3 in the axils of the leaves or above the scars of the fallen ones; flowers 5-merous, minute, yellowish, on a lin. long slender pedicels; drupes globular, the size of a cherry, 1-seeded.

HAB.—Not unfrequent in the mixed dry forests of the Prome District.—Fl. March; Fr. Apr.-May.—L.—SS.—CaS. Dil.

## STEMONURUS, Bl.

Flowers usually polygamous. Calyx cup-shaped, minutely 4-5-toothed. Petals 4 or 5, inserted at the very short polygamous disk, more or less cohering in a tube, free at apex, valvate. Stamens 4 or 5, alternating with the petals and adhering to them at the base; filaments with 2 apical cavities hiding the pendulous anthers. Ovary 1-celled, with 2 pendulous ovules; stigma sessile. Drupes crowned by the cushion-shaped stigma, the nut crustaceous. Seed pendulous. Albumen fleshy.—Trees with entire leaves. Flowers small, cymose.

× All parts glabrous.  
Leaves 2½-5 in. long; cymes leaf-opposite, the peduncle stiff and ½-1 in. long. *St. Penangians.*  
Leaves 2-3 in. long; cymes slightly puberulous, axillary and peduncled; drupes elliptically oblong, the putamen sulcate. *St. Javanicus.*  
×× Younger branches tawny tomentose; petioles, under-surface of leaves, and inflorescence puberulous or tomentose.  
Cymes peduncled, leaf-opposed. *St. tomentellus.*

1. *S. Penangianus*, Miers (*Gomphandra Penangiana*, Wall.; H.f. Ind. Fl. i. 587).—An evergreen tree, the leaf-buds slightly appressed-pubescent; leaves oblong, on a stout, short, petiole, acute at the somewhat unequal base, shortly acuminate, 2-5½ in. long, thin coriaceous, glabrous; flowers small, very shortly pedicelled, forming a trichotomously branched peduncled cyme opposite to the

leaves; calyx 4-5-toothed; corolla funnel-shaped, 4-5-cleft; stamens 4-5; the filaments hairy on the back. Ovary in males rudimentary, in females 5-angled, depressed at the apex, with a conical style; immature fruit ovoid,  $\frac{1}{2}$  in. long.

HAB.—Upper Tenasserim.

2. *S. Javanicus*, Bl. (*Gomphandra affinis*, Mast.; H.f. Ind. Fl. i. 587).—A small evergreen tree, the leaf-bud appressed fulvous-hairy; leaves obovate to elliptically oblong, on a rather slender petiole about  $\frac{1}{2}$  in. long, acute at the base, 2-4 in. long, bluntish and rather abruptly acuminate, coriaceous, glabrous; flowers small, shortly pedicelled, forming small shortly peduncled fugaceously puberulous dichotomous cymes in the axils of the leaves; calyx patelliform, almost truncate; corolla funnel-shaped, 2 lin. long; drupes oblong,  $\frac{1}{2}$  in. long, crowned by the incrassate peltate disk, the stone longitudinally furrowed.

HAB.—Tenasserim.

3. *St. tomentellus*, Kz. (*Gomphandra tomentella*, Mast. in H.f. Ind. Fl. i. 587).—Probably an evergreen small tree, the shoots and young branchlets shortly tawny tomentose; leaves oblong to elliptically lanceolate, acute at base, on a rather long and slender petiole, 6-7 in. long, abruptly and bluntish acuminate, almost coriaceous, entire, beneath downy; flowers small, sessile, forming 3-4-tomous densely tomentose rather long-peduncled cymes in the axils of the leaves; calyx hirsute; corolla glabrous; filaments club-shaped upwards.

HAB.—Burma (probably Tenasserim).

## APODYTES, E. Mey.

Calyx small, 5-toothed. Petals 5-6, valvate. Stamens 5-6, alternating with the petals and shortly cohering with their base; filaments rather thick, flattened upwards. Ovary often appendaged or thickened on the back, 1-celled, with 2 pendulous ovules; style excentric, or oblique. Nuts dry, with a fleshy puffy appendage covering the whole inner flat side, 1-2-seeded. Albumen fleshy.—Small trees with entire leaves. Flowers small, cymose.

1. *A. Andamanica*, Kz.; H.f. Ind. Fl. i. 588.—An evergreen tree (40—50 + 10—15 + 4—6), the leaf-buds thinly puberulous; leaves oblong to elliptically oblong, obtuse or acute at the often somewhat oblique base, 7-8 in. long, rather shortly petioled, acuminate, coriaceous, glabrous, opaque; flowers small, white, almost sessile, collected into dense puberulous cymes on short thick peduncles in the axils of the leaves; calyx obsoletely 5- rarely 6-toothed, shortly pubescent; petals lanceolate with the acute tip incurved,

puberulous outside; style short, oblique; nut woody-fibrous, ovate-oblong, plano-convex, terminating in a reflexed point, the thick and puffy fleshy white appendage covering the whole flat inner face.

HAB.—Frequent in the (tropical) forests of South Andaman.—Fl. Apr.-May; Fr. June-July.—s.—SS.—SiS. Metam.

### DAPHNIPHYLLOPSIS, Kz.

Calyx 5-lobed, accrescent. Petals 5, rarely 6-7, free. Stamens 10, all perfect, alternately or irregularly longer. Ovary inferior, pedicel-like, crowned with a rather large epigynous annular disk; style very short, simple. Fruit connate with the enlarged calyx, crowned by the hypogynous disk and calyx-lobes.—Trees with simple leaves. Flowers small, sessile, in axillary peduncled heads.

1. *D. capitata*, Kz.—A large evergreen tree (60—70+25—30+8—10), the shoots sparingly pubescent; leaves oblong or almost ovate-oblong, on a petiole about an in. long, thinly acuminate, rounded or obtuse at the usually oblique base, entire, coriaceous, 4-5 in. long, dotted, glossy above, beneath glaucescent and transversely veined and net-veined; flowers greenish-white, sessile with a pedicel-like ovary, forming axillary longer or shorter peduncled heads; calyx pubescent, the lobes minute, rounded, densely ciliate; drupes (unripe) obversely ovoid, about 3 lin. long, and sparingly pubescent.

HAB.—Rare in the damp hill forests of Martaban, east of Tounghoo, at 4,000 to 6,000 ft. elevation.—Fl. March.—s.—SS.—Metam.

### GONOCARYUM, Miq.

Flowers polygamous. Sepals 5, distinct, imbricate. Petals 5, cohering in a tube, free at apex, valvate. Stamens 5, alternating with the petals; the filaments high up adnate to the corolla-tube. Ovary of males imperfect, conical, in the females 1-celled, with 2 pendulous ovules; style short, thick. Drupe dry and woody. Seeds pendulous. Albumen divided into many tightly appressed lobes.—Glabrous trees with entire leaves. Flowers small, the males slender, the hermaphrodite-females in very short racemes or spikes.

Leaves opaque; drupes 4-8-angular

: : : : *G. gracile*.

Leaves glossy; drupes terete

: : : : *G. Griffithianum*.

1. *G. gracile*, Miq.; (*Phlebocalymna Wallichii*, Mast. in H.f. Ind. Fl. i. 590.—Probably an evergreen tree, all parts glabrous; leaves oblong or ovate-oblong, unequal and obtuse at base, about 5 in. long or longer, on about 5-6 lin. long petioles, bluntish apiculate, entire, very coriaceous, glabrous, opaque; flowers minute, sessile, the fertile hermaphrodites in short, the males in slender,

somewhat puberulous spikes in the axils of the leaves; calyx and ovary pubescent; style thick and short; drupes (in Sumatran specimens) all sterile, obovate, irregularly 4-3-angular, acuminate, smooth.

HAB.—Tenasserim.

2. *G. Griffithianum*, Kz., (*Phlebocalymna Griffithiana* and *Lobbiana*, Mast. in H.f. Ind. Fl. i. 590).—An evergreen tree (30—40 + 15—20 + 2—4), all parts glabrous; leaves elliptically or ovate-oblong, unequally acute or obtuse at base, 5-6 in. long, shortly and bluntish acuminate or apiculate, entire, coriaceous, shining above; flowers sessile, yellowish-white, 3 lin. long, tubular, the hermaphrodite ones forming very short glabrous racemes in the axils of the leaves; sepals 5, broad-ovate, acute, thick; petals acute; stamens 5; filaments as long as the tube and adnate to it; anthers ovate, acute; ovary puberulous; drupes about 2 in. long, oblong, obtuse, terete, woody, smooth, 1-seeded.

HAB.—Frequent in marshy places of the tropical and in swamp-forests of Southern Pegu down to Tenasserim.—Fl. Decb.-March.—s.—SS.—All. Metam. Lat. p.

### PHYTOCRENE, Wall.

Flowers dioecious. Calyx cup-shaped, soon 3-4-lobed. Petals 4, hypogynous, somewhat cohering at the base, valvate. Males: Stamens 4, alternating with the petals; filaments filiform, very shortly united round the hispid ovary-rudiment; anthers versatile. Females: Staminodes minute. Ovary conical or cushion-shaped, 1-celled with 2 pendulous ovules; stigma almost sessile. Drupes woody, packed into large heads, villous or echinate, 1-celled and 1-seeded at the base. Albumen corrugate, many-cleft.—Large climbing shrubs, with large, entire or lobed leaves. Female flowers in solitary heads, male ones in little racemose heads forming large panicles.

Male flower-heads usually more tawny tomentose, on short but very thick pedunclets, numerous in very compound racemes, in a young state terminating in a short thick tomentose bract-like sterile axis

*Ph. gigantea*.

Male flower-heads somewhat smaller and usually greyish-tomentose, on short but slender pedunclets, few (3-5) in simple short racemes terminating in long bract-like greyish-tomentose slender axes

*Ph. bracteata*.

1. *Ph. gigantea*, Wall.; H.f. Ind. Fl. i. 591.—A large woody climber, the trunk often a foot thick, irregularly tubercled, all softer parts tawny or rusty-hirsute; leaves nearly a foot long, broadly ovate or ovate-oblong, deeply cordate at base, acuminate, entire, sometimes 3-lobed, with the lobes blunt or acute, thick-membranous, above, especially along the nerves, roughish puberulous,

and glossy, beneath softly greyish or pale fawny tomentose and luxly net-veined between the palmate nerves; male flowers sessile, in little greyish or tawny tomentose heads of the size of a small pea, forming short racemes supported by a long deciduous bract and collected in elongate large fawny or greyish-tomentose raceme-like panicles arising by 3-5 from the older branches; bracts subulate, about  $\frac{1}{2}$  in. long or longer, tawny pubescent, usually fallen before opening of the flowers.

HAB.—Not unfrequent in the tropical forests along choungs of the eastern slopes of the Pegu Yomah; more frequent in Tenasserim.—Fl. Febr.—s.—SS. = SiS. Metam.

N. B.—*P. bracteata*, Wall., is said to occur in South Tenasserim.

### SARCOSTIGMA, WA.

Calyx cup-shaped, irregularly 4-5-toothed. Petals 4 or 5, adnate to the stalk-like torus and cohering in a short tube, free upwards, valvate. Males: Stamens 4-5, alternating with the petals and cohering with them at the base; filaments filiform; anthers versatile. Females: Ovary sessile beyond the corolla-tube, 1-celled with 2 pendulous ovules; stigma sessile. Drupes with a single almost woody nut. Albumen none.—Scandent shrubs, with coriaceous much net-veined leaves. Flowers minute, in long spikes.

1. *S. edule*, Kz.; H.f. Ind. Fl. i. 594.—A large woody climber, all parts glabrous; leaves oblong or elliptically oblong, rather shortly petioled, obtuse at base, very shortly and bluntish apiculate, coriaceous, entire, glabrous, strongly and elegantly net-veined on both sides; racemes rusty or tawny tomentose; drupes unequally oblong, somewhat compressed, blunt, densely and shortly tomentose, orange-coloured, with a thin edible sweetish pulp round the nut.

HAB.—Rather frequent in the tropical forests of the Andamans.—Fr. May-June.—SS. = SiS. &c.

### NATSIATUM, Ham.

Flowers dioecious. Calyx 4-5-parted. Petals 4 or 5, coherent at base, valvate. Males: Stamens 4 or 5, alternating with the petals, inserted round the ovary-rudiment; filaments very short; anthers erect. Females: Ovary sessile, 1-celled with 2 pendulous ovules; style very short. Drupes with a single crustaceous nut. Albumen fleshy.—Large climbers with cordate leaves. Flowers minute, racemose.

1. *N. herpeticum*, Ham.; H.f. Ind. Fl. i. 595.—A large climber, all softer parts shortly hispid and retrorsely rough; leaves broadly cordate, on a long and slender petiole, 4-6 in. long and broad, shortly acuminate, obsoletely repand, minutely toothed by the

excurrent nerves, membranous, on both sides rough from minute stiff hairs; flowers minute, yellowish, on rather slender hirsute pedicels, at base furnished with a bract and forming long, slender, simple or rarely divided hirsute racemes usually arising above the scars of the fallen leaves or from the leaf-axils; calyx hirsute or villous; drupes the size of a pea, irregularly ovate, glabrous, black.

HAB.—Not uncommon in the tropical forests of the Pegu Yomah; also Chittagong.—Fr. Febr.-March.—s: l.—SS. = SiS.

## IODES, Bl.

Flowers dioecious. Calyx 4-5-cleft, short. Petals 4 or 5, free, or at base united in a short tube, valvate. Males: Stamens 4 or 5, alternating with the petals, hypogynous round the ovary-rudiment and adnate to the corolla-tube; filaments very short. Females: Ovary sessile, 1-celled, with two pendulous ovules; stigma sessile. Drupes dry or fleshy, with a solitary crustaceous or bony nut. Albumen fleshy.—Scandent shrubs with entire leaves. Flowers small, cymose or paniced, the lower peduncles often reduced to tendrils.

× Flowers cymose-paniced.

Leaves on rather short thick petioles, softly tawny pubescent, beneath coriaceous; flowers almost sessile . . . . . *I. tomentella*.

Leaves membranous, on slender rather long petioles, thinly puberulous beneath; flowers on slender about  $\frac{1}{2}$  lin. long pedicels. *I. Brandisii*.

× × Flowers in simple short cymes; leaves thin, membranous, slightly and shortly puberulous while young . *I. Hookeriana*.

1. *I. tomentella*, Miq.; H.f. Ind. Fl. i. 596.—An evergreen climber, all softer parts densely and softly tawny pubescent; leaves ovate- or elliptically oblong, somewhat narrowed at the rounded base, 6 in. long or longer, on a thick 4-6 lin. long densely tomentose petiole, mucronate-acute, entire, coriaceous, above along the nerves and the whole under-surface softly tawny pubescent, strongly transversely net-veined beneath between the prominent nerves; flowers minute, pubescent, almost sessile, forming rather dense densely tawny pubescent cymes arranged in elongate robust panicles arising by pairs from between the opposite leaves or more usually one of them reduced to a twisted tendril; calyx none; petals  $\frac{1}{2}$  lin. long, pubescent; anthers erect.

HAB.—Upper Tenasserim.—Fl. Febr.

2. *I. Brandisii*, Kz.; H.f. Ind. Fl. i. 596.—A climber, all softer parts thinly and shortly pubescent; leaves oblong, obtuse at base, on a rather slender pubescent petiole  $\frac{1}{2}$ - $\frac{2}{3}$  in. long, 4-6 in. long, mucronate-acuminate, entire, thin-membranous, the nerves above and the whole under-surface thinly and minutely puberulous, green, prominently and laxly net-veined; flowers minute, pubescent, on

slender about  $\frac{1}{2}$  lin. long pedicels, forming lax cymes arranged in slender flexuose pubescent panicles arising by pairs from between the opposite petioles, sometimes the one or other panicle or branch of it reduced to a pubescent twisting tendril ; petals pale tawny hirsute, about  $\frac{1}{2}$  lin. long ; calyx none.

HAB.—Tenasserim, Thounggyeon.—Fl. March.

3. *I. Hookeriana*, Baill. ; H.f. Ind. Fl. i. 596.—A woody climber, the young shoots appressed tawny pubescent ; leaves ovate-elliptically oblong, 4-6 in. long, obtuse or rounded at base, on a 3-4 lin. long appressed tawny hirsute petiole, cuspidate, entire or nearly so, membranous, much net-veined between the prominent, sparingly and shortly hairy nerves beneath, otherwise glabrous ; female flowers on short thick pedicels, forming rather short dichotomous pubescent leaf-opposed cymes ; corolla unequally 4-5-cleft, hirsute ; ovary ovoid-oblong, up to  $\frac{1}{2}$  densely tawny-setose, further up simply pubescent, 1-celled, with a solitary erect ovule ; drupes elliptically oblong, somewhat narrowed at base, about 1-1 $\frac{1}{4}$  in. long, glabrous, the pericarp fleshy ; seed solitary, erect.

HAB.—Chittagong.

### ILICINEÆ.

Flowers regular, hermaphrodite or unisexual. Calyx 3-6-parted or-lobed, imbricate. Petals 4 or 5, rarely more or wanting, free or united at the base, hypogynous, imbricate. Stamens hypogynous, as many as petals or rarely more, free or slightly adhering to the petals ; filaments subulate ; anthers opening inwards. Disk none. Ovary free, 3-5- rarely many-celled, with 2 or 1 pendulous ovule in each cell ; style none or terminal ; stigma discoid or capitellate. Fruit a drupe containing a 2-5-celled stone or 4-8 crustaceous 1-seeded pyrenes. Testa membranous. Albumen copious, fleshy.—Trees or shrubs, with alternate simple leaves. Stipules none. Flowers small, in axillary and terminal cymes or clusters.

A small order differing from *Oleaceæ* simply in the more-celled ovary, and from *Celastrineæ* in the absence of the disk and pendulous ovules. The berries of some are emetic, and the wood of *Ilex aquifolium* is much esteemed by European cabinet-makers. The Paraguay tea is the produce of *Ilex Paraguayensis* from South America.

Petals present ; ovary 4-8-celled ; stamens 5	.	.	.	.	.	<i>Ilex</i> .
No petals ; ovary 2-celled	.	.	.	.	.	<i>Daphniphyllum</i> .

### ILEX, L.

Flowers often hermaphrodite. Calyx persistent, 4- or 5-cleft. Corolla rotate, 4-6-parted. Stamens as many or twice as many as

corolla-lobes, slightly adhering to the corolla-tube. Ovary 4-6-rarely 7-8-celled, with 1 or 2 ovules in each cell; stigmas as many as cells to the ovary, distinct or connate. Drupe globular, containing 4-8 bony or crustaceous pyrenes.—Trees or shrubs with entire or rarely toothed or spiny leaves. Flowers small, in axillary cymes.

\* *Male inflorescence cymose, the female flowers clustered or solitary.*

Leaves cuneate-lanceolate, 2-3½ in. long, very opaque and brown } *I. gaultheriæfo-*  
beneath } *lia.*

\* \* *Female flowers in simple or compound umbels or cymes.*

× Cymes head-like contracted and small, on a long compressed peduncle . . . . . *I. Godayam.*

× × Cymes divaricately 2-cleft, on a rather short peduncle.

Cymes once divaricately 2-cleft; bark pale coloured . . . . . *I. macrophylla.*

Cymes twice or thrice dichotomously branched; bark white; stigma stout . . . . . *I. cymosa.*

As preceding, but stigma sessile . . . . . *I. Wallichii.*

1. *I. gaultheriæfolia*, Kz.—An evergreen shrub or tree (?), all parts glabrous; leaves linear-lanceolate, alternate, cuneate towards the base, on a short and thick petiole, acute, 3-3½ in. long, coriaceous, glabrous, serrate, the nerves beneath conspicuous; flowers minute, on slender glabrous pedicels, forming short, slender, glabrous axillary cymes of about the length of the petioles or somewhat longer; calyx 5-lobed, the lobes broadly oblong, bluntish; petals rotundate; stamens 5, on slender filaments.

HAB.—Tenasserim,

2. *I. Godayam*, Coleb.; H.f. Ind. Fl. i. 604.—An evergreen tree (30—50 + 15—20 + 2—4), all parts glabrous or the young shoots puberulous; bark an in. thick, dark-grey, rough; cut pale, sappy; leaves from oblong- to elliptically-lanceolate, on a glabrous, usually reddish petiole ½-¾ in. long, 4-6 in. long, shortly and usually bluntish-acuminate, entire, when full grown coriaceous, glabrous, glossy dark-green above, beneath pale coloured; flowers white, on 1-3 lin. long rather slender puberulous or glabrescent pedicels, forming a small umbel at the bracted end of the compressed glabrous or puberulous 1-1½ in. long peduncles in the axils of the leaves or along the young leafless axillary branchlets; calyx glabrous or puberulous; the lobes rotundate, usually strongly or minutely ciliate; petals 4-5, rarely 6, oblong, blunt; stamens as many as petals, on filiform filaments; ovary glabrous, yellow; drupes globular, the size of a pepper-kernel, containing about 8 pyrenes, and in a dried state marked by as many furrows.

HAB.—Frequent in the tropical forests of Martaban and Tenasserim.—Fl. Febr.-Apr.—s.—SS.—Metam., Lat. p.

REMARKS.—Wood whitish, turning grey, rather heavy, fibrous and tough, rather close-grained.

3. *I. macrophylla*, Wall.; H.f. Ind. Fl. i. 604.—An evergreen small tree 15 ft. high, all parts glabrous, the branchlets grey; leaves elliptically oblong, blunt, on a short petiole 3-4 lin. long, 4-7 in. long, quite entire, rather coriaceous, glossy above, the rather distant lateral nerves prominent; flowers shortly pedicelled, small, 4-6-merous, forming small 2-cleft glabrous or minutely puberulous cymes along the younger leafless branchlets and therefore appearing often racemose; calyx-lobes orbicular; petals broadly oblong, blunt; drupes globular, about 3 lin. in diameter, terminated by a sessile stigma, containing 6-8 much compressed sharply 3-gonous pyrenes.

HAB.—Tenasserim.

4. *I. cymosa*, Bl.; H.f. Ind. Fl. i. 605.—An evergreen small tree, all parts quite glabrous, the branchlets and bark pure white; leaves elliptical to elliptically oblong, on a rather strong petiole 3-4 lin. long, blunt or bluntish acuminate, 3-5 in. long, rather chartaceous, entire, pale coloured beneath, the lateral nerves beneath very thin; flowers 4-5-merous, small, on slender pedicels 3 lin. long, in small cymes or umbels collected in a long-peduncled dichotomously branched cyme in the axils of the leaves or above the scars of the fallen ones; calyx-lobes orbicular; petals 4-8, unequal, erect, concave; drupes globular, about 2 lin. thick, terminated by a stout distinct style, grooved when dry, containing 8 trigonous compressed pyrenes.

HAB.—Tenasserim.

5. *I. Wallichii*, H.f. Ind. Fl. i. 605.—A shrub or tree (?), glabrous, the branchlets white; leaves elliptical or elliptically ovate, on a  $\frac{1}{2}$  in. long petiole, blunt, quite entire, thinly coriaceous, 4-5 in. long, pale beneath, the lateral nerves very faint, spreading; drupes  $\frac{1}{2}$  in. in diameter, terminated by a sessile stigma, containing about 12 compressed stones. (After Hooker.)

HAB.—Tenasserim.

### DAPHNIPHYLLUM, Bl.

Flowers unisexual. Calyx 3-8-parted, the lobes persistent or deciduous, imbricate. Petals none. Hypogynous glands 4-6, rather large, or wanting. Stamens 5-18, central, on a convex receptacle; anthers opening by 2 slits. Ovary free, 2-celled, with 2 pendulous ovules in each cell; stigmas 2, sessile. Fruit a 1-seeded drupe. Seeds albuminous.—Trees or shrubs, with alternating and often crowded simple leaves. Flowers small, in axillary racemes.

Calyx deciduous; pedicels about 1-2 lin. long : : : *D. Himalayense*.  
Calyx persistent(?); pedicels about  $\frac{1}{2}$  in. long : : : *D. majus*.

1. *D. Himalayense*, Muell. Arg.—An evergreen tree (50—60 + 20—25 + 4—6), all parts glabrous; leaves oblong to ovate-lanceo-

late, on a  $1\frac{1}{2}$  to nearly 2 in. long petiole, acute at base, 3-4 in. long, acute or shortly acuminate, entire, chartaceous, glabrous, somewhat glaucescent beneath, on both sides (especially above) laxly net-veined; flowers on strong 1-2 lin. long pedicels, forming a short glabrous rather robust raceme in the axils of the leaves or above the scars of the fallen ones; anthers 5, dorsally compressed; calyx deciduous; drupes ellipsoid-oblong, about  $\frac{1}{2}$  in. long, smooth, on  $\frac{1}{3}$ - $\frac{2}{3}$  in. long peduncles.

HAB.—Rather rare in the damp hill forests of the Martaban hills at about 5,000 ft. elevation.—s.—SS.—Metam.

2. *D. majus*, Muell. Arg.—All parts glabrous, the branchlets glaucous; leaves ovate-oblong to oblong, on a 2-3 in. long petiole, rounded or acute at base, 5-6 in. long, acuminate, entire, chartaceous, glabrous, glaucous beneath; flowers on about  $\frac{1}{2}$  in. long pedicels, forming a short glabrous axillary raceme; calyx apparently persistent in the males; stamens 8; the anthers laterally compressed; rest unknown.

HAB.—Tenasserim.—Fl. Febr.

### CELASTRINEÆ.

Flowers usually hermaphrodite. Calyx small, 4-5-lobed or -parted, persistent, imbricate. Petals 4 or 5, imbricate. Stamens 3-5 (very rarely 2-10), inserted at the base of the disk or its lobes; filaments subulate, often short; anthers 2-celled. Disk conspicuous, cushion-like or explanate or lobed. Ovary sessile on the disk, free at the base or confluent with the disk, 3-5- (rarely 1-) celled, with usually 2 erect or rarely 1 or more ascending or suspended ovules in each cell; style simple, rarely 3-5-cleft. Fruit various, a capsule, berry, drupe, or samara. Seeds often arillate, sometimes winged. Albumen fleshy or almost horny, or none.—Trees or shrubs, sometimes thorny, rarely climbers, with opposite or alternate simple leaves often drying glaucous. Stipules very minute and deciduous or none. Flowers small or minute, in axillary cymes or racemes or in terminal panicles.

Most *Celastrineæ* are readily recognized by the peculiar large disk; from *Rhamnaceæ* they differ in having the stamens alternating with the petals. An order of little medicinal and economic value, but the timber of many of them when better known may be found serviceable for many purposes, especially for cabinet-work.

\* *Stamens usually 5 or 4 (very rarely 10), inserted outside the disk or its borders; filaments usually incurved.*

*Seeds albuminous.*

○ Capsules or follicles dehiscent.

+ Ovules from the axis of the cells; leaves opposite.

Petals free; disk fleshy, broad; capsules 3-5-lobed and-celled . *Evonymus*.

- Petals connate at base; disk none or annular; capsule 1-celled, 2-valved . . . . . *Microtropis*.  
 + + Ovules erect. Leaves alternate. . . . .  
 Capsules 2-4-celled, loculicidal . . . . . *Celastrus*.  
 Capsules entire or 2-lobed, 1-2-celled, follicle-like, and slowly 1- or 2-valved . . . . . *Kurrimia*.  
 ○ ○ Fruit indehiscent.  
 Ovary superior, confluent with the disk; drupe containing a 1-3-celled putamen . . . . . *Elæodendron*.  
 Ovary half-inferior, 6-celled; berry large, containing many pyrenes . . . . . *Siphonodon*.  
 \* \* Stamens 3 (rarely 2-5), inserted within or on the disk; filaments usually recurved. Albumen none.  
 ○ Fruit indehiscent, a berry, 1-many-seeded; seeds not winged . . . . . *Salacia*.  
 ○ ○ Fruit capsular or samaroid, dehiscent; seeds winged.  
 Capsule 3-4-celled, loculicidal, angular; erect trees . . . . . *Lophopetalum*.  
 Ripe carpels usually 3, samaroid, 2-valved; scandent shrubs . . . . . *Hippocratea*.

## EVONYMUS, L.

Calyx 4-5-lobed, the lobes spreading or recurved. Petals 4 or 5, inserted round the disk, spreading. Stamens as many, inserted on the disk or rarely at its border; the filaments usually very short; anthers didymous. Disk fleshy, ample, broadly explanate, 4-5-lobed. Ovary immersed in the disk or confluent with it, 3-5-celled, with 2 or rarely more ovules in each cell, ascending at the interior angle; style short. Capsule 3-5-celled and lobed, angular or winged, opening loculicidally in 3 to 5 valves bearing the septa on their middle. Seeds arillate. Albumen fleshy.—Trees or shrubs, with opposite, entire or serrate leaves. Stipules deciduous. Flowers small, in axillary cymes, rarely almost solitary. Arillus usually bright red.

× *Branchlets terete or only slightly 4-cornered.*

\* *Capsules smooth.*

- Flowers small, in dichotomous cymes; petals entire; capsules angular; leaves slightly serrate upwards . . . . . *E. glaber*.  
 Flowers nearly 5-6 lin. in diameter, in clusters or almost solitary; petals fringed; capsules obovate, sharply angular, on  $\frac{1}{2}$  to 1 in. long peduncles; leaves entire or obscurely serrate. . . . . *E. javanicus*.  
 Capsules globular, obtusely lobed, on very short peduncles or almost sessile; leaves entire . . . . . *E. calocarpus*.  
 \* \* *Capsules warty rough* . . . . . *E. sclerocarpus*.  
 × × *Branchlets 4-cornered and almost winged; capsules small* . . . . . *E. Griffithii*.

1. *E. glaber*, Roxb.; H.f. Ind. Fl. i. 609.—An evergreen tree (30—40 + 10—20 + 2—4) with terete branchlets, all parts quite glabrous; bark about 2 lin. thick, rather smooth, grey; cut red; leaves obovate-oblong to oblong, shortly petioled, acute at

base, serrate towards the short rather blunt point, chartaceous, 3-6 in. long, glabrous; flowers 5-merous, small, 3-4 lin. in diameter, on short but slender pedicels, forming long-peduncled, slender, dichotomous cymes, either solitary in the axils of the leaves or almost racemose along the young axillary branchlets; petals white, entire, broadly oblong; disk green; capsule about 5-6 lin. long, obcordate, sharply 5-4-cornered.

HAB.—Chittagong; not unfrequent in the tropical forests of Martaban and Tenasserim; rare in those of the eastern slopes of the Pegu Yomah.—Fl. March-Apr.; Fr. Sept.—s.—SS.—Metam.

REMARKS.—Wood of a brown-yellowish colour, turning brown, heavy, coarsely fibrous, rather close-grained, rather hard, but soon attacked by xylophages. Fine wood for furniture.

2. *E. Javanicus*, Bl.; H.f. Ind. Fl. i. 607.—An evergreen tree (30+10—12+1½—2). with terete branchlets, all parts quite glabrous; leaves elliptical, obovate-oblong to oblong, on a short but slender petiole, somewhat narrowed towards the acute base, shortly acuminate, entire or slightly serrate towards the point, 5-6 in. long, chartaceous, glabrous; flowers about 5-6 lin. across, on straight usually 6-8 lin. long (but often also much shorter or longer) strong pedicels, several together arising from short rusty-bracted tubercles, or almost solitary; petals oblong, long-fringed; stamens 5; the filaments inserted in the grooves of the disk-lobes; capsules pyriform or obovate, 5-10 lin. long, sharply 5-4-cornered, terminating in a sharp point or acuminate, smooth; the valves almost woody.

HAB.—Tropical forests of Tenasserim.—Fl. March.—s.—SS.—Metam.

REMARKS.—Wood like that of the preceding species.

3. *E. calocarpus*, Kz.; H.f. Ind. Fl. i. 609.—A shrub or tree (?), with terete branchlets, all parts glabrous; leaves oblong or oblong-lanceolate, on a 3-4 lin. long petiole, shortly and bluntish-acuminate, entire, almost coriaceous, 4-6 in. long, pale beneath; capsules on very short glabrous peduncles or almost sessile, usually obsoletely 4-lobed and 4-valved, quite smooth, with a single red-arilled seed in each cell.

HAB.—Tenasserim.

4. *E. Griffithii*, Kz.; H.f. Ind. Fl. i. 611.—An evergreen shrub, with 4-cornered almost winged branches, all parts glabrous; leaves oblong-lanceolate or oblong, 2-3 in. long, on a very short petiole or almost sessile, obtuse at base, almost entire or obscurely serrate, acuminate, chartaceous, glabrous and smooth, pale beneath; flowers small, greenish white, on slender pedicels 3 lin. long, forming very slender dichotomous cymes in the axils of the leaves and much shorter than them; calyx broad, nearly 2 lin. in diameter, 4-lobed;

petals and stamens 4, the former about 2 lin. long, rotundate; ovary smooth, 4-lobed and -celled.

HAB.—Not unfrequent in the damp hill-forests of the Martaban hills, at 6,000 to 7,000 ft. elevation.—Fl. March-Apr.—F.—SS.—Metam.

5. *E. sclerocarpus*, Kz. (*Glyptopetalum sclerocarpum*, Laws. in H.f. Ind. Fl. i. 613).—An evergreen tree (8—12+3—5+1), the branchlets terete or compressed, all parts glabrous; bark red; leaves oblong- to elliptically lanceolate, on a 3-1 lin. long thick petiole, acuminate at both ends, 6-8 in. long, coriaceous, serrate; flowers greenish purple, on long slender pedicels, forming lax, glabrous, solitary or more usually clustered peduncled cymes in the axils of the leaves or above the scars of the fallen ones; sepals white, broadly semi-orbicular; petals almost concave-orbicular, green outside, purplish green inside; stamens 4; anthers sessile on the obsoletely 4-gonous green broad disk; stigma sessile, obsoletely 4-cornered; capsules more or less globular or 2-lobed, the size of a large pea, very rough from scurfy fissures and warts; arillus blood-red.

HAB.—Rather rare in the tropical forests around the Kambala in the Pegu Yomah.—Fl. & Fr. S.—SS.—SiS.

REMARKS.—Wood white, soft, straightly and finely fibrous, close-grained.

### MICROTROPIS, Wall.

Flowers sometimes unisexual. Sepals 5, imbricate, persistent. Petals 5 (rarely none), more or less erect and united at base in a persistent ring, either free or confluent with the disk. Stamens 5. Disk annular or none. Ovary free, perfectly or imperfectly 2-3-celled, with 2 ovules in each cell. Capsule coriaceous, 1-celled, 2-valved, and slowly follicle-like dehiscing. Seeds solitary, erect. Albumen fleshy.—Glabrous shrubs or trees, with opposite entire leaves. Flowers small, in axillary cymes or clusters. Seeds usually red, the testa often arillus-like succulent.

Leaves wrinkled, especially above, and more coriaceous . . . *M. longifolia*.

Leaves smooth, of a thinner texture.

Cymes dichotomous, on an 1-1½ in. long slender peduncle; leaves glossy above . . . *M. livalvis*.

Cymes dichotomous and very short; the peduncles 3-5 lin. long; leaves opaque on both sides . . . *M. garcinifolia*.

1. *M. longifolia*, Wall.—An evergreen shrub (?), all parts glabrous; leaves oblong-lanceolate or oblong, on a thick 4-5 lin. long petiole, acute at base, 6-7 in. long, shortly acuminate, entire, coriaceous, opaque, on both sides (especially above) wrinkled; flowers in short cymes; peduncle 4-6 lin. long; capsules obovate, seeds red.

HAB.—Tenasserim.—Fr. Octob.

2. *M. bivalvis*, Wall. ; H.f. Ind. Fl. i. 614.—A small evergreen tree, all parts glabrous, leaves lanceolate or oblong-lanceolate, acute at base, on a 3-4 lin. long petiole, shortly and bluntish-acuminate, 3-5 in. long, entire, thin coriaceous, especially above glossy, pale beneath ; flowers small, on very short thick pedicels or almost sessile, supported by a minute bractlet, forming a small dichotomous cyme on slender 1-1½ in. long, axillary or lateral peduncles ; sepals coriaceous, rotundate, with whitish borders ; petals twice as long as the sepals (or wanting?) ; capsules about 4-5 lin. long, elliptically oblong, terminated by the short style, smooth.

HAB.—In the tropical forests of Tenasserim.—Fl. Febr.-Sept. ; Fr. Octob.—s.

3. *M. discolor*, Wall. ; H.f. Ind. Fl. i. 514.—An evergreen shrub, about 6-8 ft. high, all parts glabrous ; leaves lanceolate or oblong-lanceolate, on a thick 3-4 lin. long petiole, acuminate at base, entire, shortly and finely acuminate, glabrous, opaque, pale beneath, somewhat coriaceous, 5-7 in. long ; flowers small, whitish, soon turning yellowish, on very short thick pedicels or almost sessile, forming dense short cymes on 2-4 lin. long thick peduncles in the axils of the leaves or more frequently laterally ; sepals coriaceous, rotundate ; petals nearly 1½ lin. long ; capsules oblong, the size of a small field-bean, smooth, 2-valved, 1-seeded, the seed oval, with a thin succulent-veined scarlet testa.

HAB.—Rather frequent in the damp hill-forests of Martaban and Tenasserim at 5,000 to 7,000 ft. elevation.—Fl. March.—s.—SS.—Metam.

## CELASTRUS, L.

Flowers sometimes unisexual. Calyx urceolate at base, 5-cleft. Petals 5, inserted round the disk. Stamens 5, inserted on the sinuses of the cup-shaped or concave 5-lobed disk ; filaments subulate ; anthers ovoid or oblong. Ovary free or confluent with the disk, 2-4-celled, with 2 erect ovules in each cell ; style usually short. Capsule 2-4-celled and 2-4-valved, loculicidal. Seeds 1 or 2 in each cell, more or less completely arillate, rarely the arillus wanting. Albumen fleshy.—Trees or shrubs, often scandent, with alternate leaves. Stipules none or minute. Flowers small, in terminal or axillary panicles, racemes or cymes.

- |   |                        |
|---|------------------------|
| × Capsule 2-valved ; cymes short and slender, axillary . . .  | <i>C. acuminatus.</i>  |
| ×× Capsule 3-valved.  |                        |
| ○ Cymes dichotomously branched, axillary . . .  | <i>C. montanus.</i>    |
| ○○ Cymes forming racemose panicles.   |                        |
| Raceme-like panicles terminal ; leaves obovate ; capsules several-seeded . . .                          | <i>C. paniculatus.</i> |
| Raceme-like panicles axillary (and terminal) ; leaves elliptically lanceolate ; capsules 1-seeded . . . | <i>C. monospermus.</i> |

1. *C. acuminatus*, Wall. (*Gymnosporia acuminata*, Wall.; H.f. Ind. Fl. i. 619.)—An evergreen shrub (?), unarmed, all parts glabrous; leaves lanceolate or oblong-lanceolate, on a 3-4 lin. long petiole, narrowed and acute at base, 5-7 in. long, shortly acuminate, crenate-serrate, chartaceous, glabrous; flowers minute, on long slender pedicels, forming short but very slender (almost capillary) glabrous dichotomous cymes arising solitary or by 2-4 from axillary or lateral short tubercles; calyx glabrous, 5-lobed; petals about  $\frac{1}{2}$  lin. long or somewhat longer; capsules 2-celled and 2-valved, obovate, somewhat compressed, the size of a small cherry, smooth, on  $\frac{1}{2}$  in. long or longer peduncles.

HAB.—Ava hills.—Fl. Apr.

2. *C. montanus*, Roxb. (*Gymnosporia montana*, Laws. in H.f. Ind. Fl. i. 621.)—A small usually crooked tree, armed with leaf- and flower-bearing spine-like reduced branches, or unarmed, all parts glabrous; leaves obovate, tapering at base, on a 4-5 lin. long slender petiole, blunt or almost emarginate with a minute mucro, minutely but rather sharply serrulate, membranous, glabrous, glaucous-green, 2-2 $\frac{1}{2}$  in. long; flowers small, whitish, on slender pedicels, forming dichotomously branched glabrous cymes on 3-2 lin. long peduncles or almost sessile in the axils of the leaves; branchlets acute; petals about a line long; capsules small, turbinate, hardly 4 or 5 lin. long, opening in 8 valves, containing in each cell 2 small shining red seeds resting on a short white fleshy arillus.

HAB.—Burma, without locality—probably Prome.

3. *C. paniculatus*, Willd.; H.f. Ind. Fl. i. 617; Brand. For. Fl. 82.—A deciduous large scandent or spreading shrub, glabrous, or the shoots slightly puberulous; bark brownish grey, lenticellate; leaves broadly oval and ovate to obovate, on a rather long and slender petiole, 2-3 in. long, usually bluntish-acuminate or shortly acuminate, sometimes quite blunt, crenate-serrulate, glabrous or beneath puberulous; flowers small, yellowish, on slender puberulous or glabrous pedicels, forming puberulous or almost glabrous elongate raceme-like panicles at the end of the branchlets; calyx-lobes rotundate, ciliate, puberulous; petals about a line long, oblong-lanceolate; disk thin, free; capsules globular, the size of a small pea, 3-celled and 3-valved, each cell containing 1 or 2 yellowish seeds completely enveloped by the scarlet arillus.

HAB.—Not unfrequent from Ava to Pegu, in all leaf-shedding forests, especially the dry and open ones.—Fr. Sept.-Oct.—l.—SS= $\infty$  *petrophilous*.

4. *C. monospermus*, Roxb.; H.f. Ind. Fl. i. 618.—An evergreen scandent shrub, all parts glabrous; leaves elliptical to oblong, acute or obtuse at base, on a 3-4 lin. long petiole, bluntish-acuminate,

2-4 in. long or longer, serrulate, coriaceous, glossy, drying blackish; flowers small, pale greenish yellow or white, very shortly pedicelled, in small cymes, forming axillary and terminal elongate raceme-like glabrous panicles; calyx-lobes rounded; petals rotundate, about a line long; disk flat, slightly 5-lobed; capsules the size of a cherry, 3-lobed-oblong, stylose-acuminate, smooth, 3-valved, containing a single seed entirely covered with an orange-coloured pulpy arillus.

HAB.—Ava hills.—Fr. March.

### KURRIMIA, Wall.

Calyx 5-cleft, the lobes recurved. Petals 5. Stamens 5, inserted with the petals under the margin of the fleshy 5-lobed disk; filaments short; anthers didymous. Ovary immersed in the disk, free, 2-celled, with 2 basilar erect ovules in each cell; styles 2, filiform, twisted. Capsule 1- or 2-celled, entire or 2-lobed, slowly and follicle-like opening into 1 or 2 valves, 1-2-seeded. Seeds erect, enclosed in a fleshy arillus. Albumen plenty, fleshy.—Trees with simple leaves, faintly and elegantly transversely veined between the nerves. Stipules deciduous. Flowers small, in axillary simple or compound racemes.

Racemes simple; capsules ovoid-oblong, entire . . . . *K. robusta*.  
 Racemes paniced; capsules 2-lobed at the apex . . . . *K. paniculata*.

1. *K. robusta*, Kz. (*K. pulcherrima*, Wall.; H.f. Ind. Fl. i. 622).—*Kway-douk*.—An evergreen tree (60—70 + 30—40 + 8—12), all parts quite glabrous; bark  $\frac{1}{2}$  in. thick, roughish, blackish brown; leaves oblong or oblong-lanceolate, obtuse or acute at base, on a  $\frac{3}{4}$ —1 $\frac{1}{2}$  in. long petiole, entire, almost coriaceous or chartaceous, shortly acuminate or acute, 5-7 in. long, metallic-glossy; flowers small, greenish yellow, very shortly pedicelled, forming simple glabrous racemes either solitary or by 2-3 in the axils of the leaves and much shorter than them; calyx-lobes oblong; petals oblong, spreading; capsules ovoid-oblong, terete or nearly so, shortly and bluntish acuminate, an in. long or somewhat shorter or longer, follicle-like opening on one side only or into 2 valves, containing 1-2 large glossy-black seeds completely enveloped in a bright yellow, afterwards orange-coloured arillus.

HAB.—Rare in the tropical forests along the eastern slopes of the Pegu Yomah, but frequent in those of Martaban and Tenasserim; also Chittagong.—Fl. Febr.; Fr. Apr-Aug.—s.

REMARKS.—Wood brown, heavy, fibrous and close-grained, brittle.

N. B.—*K. paniculata*, Wall., is said to occur in Tenasserim.

## SIPHONODON, Griff.

Calyx 5-parted, the lobes rotundate. Petals 5, erect-spreading. Stamens 5, hypogynous; filaments complanate; anthers small. Ovary half-immersed in the base of the calyx, many-celled, the cells in 2-4 rows, 1-ovuled. Berry large, granular-fleshy and hard, containing numerous transversely superposed woody pyrenes adhering to the inner angle of the fruit. Seeds not arillate. Albumen almost horny.—Trees with alternate leaves. Stipules minute, deciduous. Flowers rather small, in axillary poor umbels.

1. *S. celastrinus*, Griff.; H.f. Ind. Fl. i. 629.—*Myouk-opshit*.—An evergreen tree (30—50 + 20—25 + 3—4), all parts glabrous; bark dark-grey, brittle, granular, rough from transverse short corky lenticels; cut dry, granular; leaves oblong or elliptically oblong, acute at the base, shortly petioled, acuminate, 5-6 in. long, crenate-serrate, chartaceous, glossy above, glabrous; flowers about 4-6 lin. in diameter, yellowish, on 2 lin. long thick pedicels, either solitary or by 2-4 on an 1-2 lin. long axillary peduncle, supported by minute bractlets; berries the shape and size of a small citron, elliptically obovoid to pyriform, on a cylindrical 4-6 lin. long peduncle, the pyrenes surrounded by the granular hard reddish-yellow endocarp.

HAB.—Frequent in the tropical forests of the eastern slopes of the Pegu Yomah and Martaban.—Fr. Jan.-May.—s.—SS.—Metam. SiS.

REMARKS.—Wood pale yellowish, heavy, of a coarse unequal fibre, hard and rather brittle.

## LOPHOPETALUM, Wight.

Calyx small, 5-lobed. Petals 5, crested or lamellate, fringed or entire. Stamens 5, inserted on the disk; anthers oblong. Disk broad and thick, more or less lobed. Ovary immersed in the disk and more or less free, pyramidally 3-angular, 3-celled, with 4-12 biseriate ascending ovules in each cell. Capsule almost woody, 3-celled, opening loculicidally into 3 valves. Seeds imbricate, broadly and elongate winged all round. Albumen none.—Trees with opposite leaves. Stipules minute, deciduous. Flowers small, in terminal and axillary corymb-like panicles or cymes.

\* Petals fringedly crested on the upper side . . . *L. fimbriatum*.

\* \* Petals naked and entire.

Petioles an in. long or longer; panicles white, quite glabrous, stiff and short; petals  $1\frac{1}{2}$  lin. long . . . *L. Wallichii*.

As former, but panicles large and slenderly branched; flowers half as large . . . *L. littorale*.

Petioles 3-4 lin. long; panicles white young fugaciously rusty-tomentose . . . *L. floribundum*.

1. *L. fimbriatum*, Wight.; H.f. Ind. Fl. i. 615.—A tree, all parts quite glabrous; leaves elliptical to elliptically oblong, acute, on a  $\frac{1}{2}$  to 1 in. long rather slender petiole, more or less rounded at base, from 3-5 in. long, chartaceous or almost coriaceous, glabrous, in drying turning brownish beneath; flowers about 4 lin. in diameter, on 2-3 lin. long slender pedicels, forming lax, slender, peduncled eymes in the axils of the leaves; disk 5-lobed; petals obovate, narrowed at the base, long and elegantly fringed round the margins of the disk-lobes.

HAB.—Martaban and Tenasserim.—Fl. March.

2. *L. Wallichii*, Kz.; H.f. Ind. Fl. i. 615.—*Mong-taing*.—A tree (50—70 + 30—40 + 6—8), shedding leaves during H.S., all parts glabrous; bark about  $\frac{3}{4}$  in. thick, rather smooth, grey, soft; cut dark-red; leaves from elliptically to oval-oblong, on a  $\frac{3}{4}$ —1 $\frac{1}{2}$  in. long petiole, rounded at the base, 4-6 in. long, blunt to acute, entire, glaucous-green, glossy above; flowers about 2-2 $\frac{1}{2}$  lin. in diameter, on 1-1 $\frac{1}{2}$  lin. long white pedicels, forming rigid greenish-white quite glabrous panicles in the axils of the leaves and at the end of the branchlets; petals greenish white, rotundate, naked and entire, in a dried state corrugate inside; disk large, fleshy, yellow, smooth, in a dried state wrinkled, the 5 deflexed stamens inserted on the same; ovary blood-red or crimson; capsules about 4 in. long or somewhat longer by 2 broad, 3-lobed and 3-valved, the valves smooth; seeds compressed, imbricate (including the wing), 2-2 $\frac{1}{2}$  in. long, oblong, completely surrounded by the membranous wing.

HAB.—Common in the open, and more especially in the Eng forests all over Pegu and Martaban down to Tenasserim.—Fl. Jan.-March; Fr. March-Apr.—I.—SS.—*Lat. Dil. Metam.*

REMARKS.—Wood pale, turning pale-brown, finely and rather loose-grained, hard, rather light, the annual rings very narrow, the heart-wood brown. Recommended for furniture.—W= $\square$ ' 33-38; break weight=121 pd.

3. *L. littorale*, Kz. (*Kokoona littoralis*, Laws. in H.f. Ind. Fl. i. 617).—*Mong-taing*.—An evergreen tree (40—60 + 15—25 + 5—7), all parts glabrous; leaves oval to oval-oblong, on a slender petiole  $\frac{1}{2}$ —1 in. long, rounded at the base, blunt or somewhat acute, 3-5 in. long, coriaceous, entire, glaucescent beneath; flowers small, whitish, on slender about a line long pedicels, brachiate-eymose and forming rather large slenderly peduncled and branched glabrous panicles in the axils of the upper leaves and at the end of the branches; petals hardly a line long, rotundate, in a dried state more or less longitudinally corrugate; disk along the margin or wholly wrinkled in a dried state; capsules 2 $\frac{1}{2}$ —3 in. long, coriaceous, triquetrous, blackish brown, smooth, 3-valved; seeds 1 $\frac{1}{2}$ —2 in. long, oblong, compressed, broadly winged all round.

**HAB.**—In low lands inundated during R.S. of the Pazwoondoung river of Pegu ; in Upper Tenasserim apparently frequent.—**Fl.** Feb.-March ; **Fr.** March-April.—**l.**—**SS.**—**All.**, Arg.

4. *L. floribundum*, Wight. ; H.f. Ind. Fl. i. 616.—An ever-green tree, about 35 ft. high, all parts glabrous ; leaves lanceolate or oblong-lanceolate, on a 3-4 lin. long petiole, acute at the base, 3-4 in. long, acuminate or acute, somewhat waved, glabrous, coriaceous, glaucous-green and almost opaque above, somewhat glossy beneath, the nerves rather prominent ; flowers nearly 3 lin. in diameter, on  $\frac{1}{2}$ -1 lin. long rusty-villous glabrescent pedicels, forming very fugaciously rusty-tomentose, slender, axillary and terminal panicles at the end of the branchlets ; sepals and petals rotundate, the latter about a line long, naked and entire.

**HAB.**—South Tenasserim, in dense forests.—**Fl.** Decb.

### HIPPOCRATEA, L.

Calyx small, 5-parted. Petals 5, valvate or imbricate. Stamens 5 (usually 2 or 3 of them reduced), the filaments recurved or reflexed ; anthers didymous, 2-4-celled, opening outwardly. Disk conical, cup-shaped, or broadly explanate. Ovary free or confluent with the disk, 3-celled, each cell with 2-4 biseriate ovules attached to the axis. Ripe carpels 3, united at the base, compressed, opening into 2 valves or indehiscent, few-seeded. Seeds compressed, usually winged at the lower end. Albumen none.—Little trees or shrubs, usually scandent, with opposite leaves. Stipules small, deciduous. Flowers small, in axillary panicles or cymes.

\* *Petals imbricate in bud.*

Petals hardly  $\frac{1}{2}$  lin. long ; sepals whitish marginate ; leaves glaucous-green

*H. Indica.*

Petals about a line long ; sepals erose-ciliolate ; leaves blackish in drying

*H. fuscescens.*

\* \* *Petals valvate in bud.*

Calyx minute, puberulous ; stamens 3

*H. macrantha.*

1. *H. Indica*, Willd. ; H.f. Ind. Fl. i. 624 ; Brand. For. Fl. 83.

—A large scandent shrub with terete branchlets, all parts glabrous ; leaves obovate-oblong or obovate-lanceolate, shortly petioled, acuminate or apiculate, 2 $\frac{1}{2}$ -3 in. long, membranous or chartaceous, remotely serrulate, glaucous-green, glabrous ; flowers minute, greenish, on a lin. long slender pedicels, forming slender, glabrous, minutely and acutely bracted cymes or cymose panicles on 1-1 $\frac{1}{2}$  in. axillary peduncles much shorter than the leaves ; calyx minute, the lobes whitish bordered ; petals imbricate in bud, hardly  $\frac{1}{2}$  line long ; carpels 3, or fewer by abortion, flat, elliptically-oblong, blunt, about 2 in. long, striate, each containing 2 long-winged seeds.

**HAB.**—In the open forests of Toukyeghat in Martaban, rather rare.—**Fl.** Apr.—**l.**—**SS.**—**Lat.**, Metam.

2. *H. fuscescens*, Kz.—A scandent shrub? all parts glabrous; leaves oblong-lanceolate or oblong, acute at the base, on a 4-5 lin. long thick petiole, shortly acuminate,  $2\frac{1}{2}$ -3 in. long, coriaceous, obsoletely crenate-serrate, glabrous, glossy above, turning blackish or dark-brown in drying; flowers about 2 lin. in diameter, on 1-1 $\frac{1}{2}$  lin. long pedicels, cymose, forming glabrous shortly peduncled or already from the base branched panicles in the axils of the leaves and somewhat shorter than them; sepals minutely erose-ciliate; petals obovate-oblong, concave, narrowed towards the base, about a lin. long, imbricate in bud; anthers 3, on very short reflexed filaments arising from the raised disk.

HAB.—Tenasserim.

3. *H. macrantha*, Korth.—A scandent shrub, the branchlets marked with 4 decurrent lines, all parts glabrous; leaves oblong or elliptically oblong, obtuse or almost rounded at the base, on a 4-5 lin. long petiole, apiculate or shortly and bluntish acuminate, more or less bluntish crenate-serrate, almost coriaceous, 3-5 in. long, glabrous; flowers about 3-4 lin. in diameter, on 2-3 lin. long thick shortly puberulous pedicels, forming minutely puberulous short-bracted longer or shorter (1-1 $\frac{1}{2}$  in.) peduncled cymes in the axils of the leaves and much shorter than them; calyx minute, puberulous; petals oblong-lanceolate, minutely puberulous outside, valvate in bud; stamens 3; carpels 3, or fewer by abortion, about 3-4 in. long, elongate-oblong, flat, blunt, each containing 4-3 long-winged brown compressed seeds.

HAB.—Tropical forests of Chittagong; Tenasserim.—Fr. H.S.

## SALACIA, L.

Calyx small, 5-parted. Petals 5, imbricate in bud. Stamens 3 (very rarely 2 or 4), inserted in the disk near the ovary, free or united with the ovary; filaments conniving and recurved at the apex; anthers small, the cells distinct or confluent, dehiscing longitudinally or transversely. Disk thick, conical or explanate. Ovary immersed in the disk, 3-celled, each cell with 2 or more ovules in a single or double series along the axis. Fruit a berry, 1-3-celled, pulpy, the pericarp coriaceous or almost woody, the cells 1-4-seeded. Seeds usually angular, not winged.—Scandent often arboreous shrubs, rarely erect, with usually opposite leaves. Stipules none. Flowers small, solitary, or few or more, commonly in axillary clusters or cymes, rarely panicles.

× Cymes peduncled and dichotomously branched, usually short. Branchlets terete; pedicels thick, 6-8 lin. long; sepals not ciliate. *S. longifolia*. Branchlets angular and marked by 3 decurrent raised lines; pedicels c. 4 lin. long, slender, arising from the globular rusty-bracted ends of branchings; sepals ciliate. *S. tortuosa*.

× × Cymes sessile, i. e., the pedicels arising directly from a tubercle or wart.

- Petals about 3-4 lin. long; pedicels 2-3 lin. long, thick. *S. grandiflora*.  
 ○ Petals less than 2 lin. long; filaments very short and complanate.

† Leaves turning brown or blackish in drying.

Branchlets dark-brown, densely corky-lenticellate; leaves entire . *S. verrucosa*.

Branchlets pale coloured, sparingly lenticellate; leaves serrate . *S. Roxburghii*.

† † Leaves turning yellowish or pale-green in drying.

† Berries by abortion 1-celled and 1-seeded . *S. prinoides*.

† † Berries several-seeded.

Leaves lanceolate; pedicels 1-1½ lin. long . . . . . *S. flarescens*.

Leaves ovate lanceolate; pedicels numerous, longer than the petiole . . . . . *S. multiflora*.

\* *Cymes peduncled, usually short.*

1. *S. longifolia*, Wall. (*S. floribunda*, Wight; II.f. Ind. Fl. i. 629).—A large scandent shrub, the branchlets terete or slightly compressed, minutely tubercled, all parts glabrous; leaves oblong or oblong-lanceolate to lanceolate, acute or obtuse at the base, on a 5-6 lin. long petiole, apiculate or bluntish acuminate, 4-5 in. long, almost coriaceous, more or less serrate-toothed, glabrous, glossy, dark-colouring in drying; cymes as long or much longer than the petioles, on ½ an in. long peduncle, glabrous, once or usually twice dichotomous; flowers small, greenish, on 6-8 lin. long thick pedicels, at base subtended by broad minute bractlets; sepals rotundate, small, entire; petals sessile, rotundate, about ½ a line long; anthers 3, on very short dilated reflexed filaments; berries obovoid or almost globose, the size of a cherry, smooth, 2-celled and 2-seeded.

HAB.—Tenasserim.—Fr. Jan.

2. *S. tortuosa*, Griff.—A large scandent shrub, all parts glabrous, the branches angular and minutely lenticellate, the branchlets more or less compressed; leaves oblong-lanceolate or lanceolate, acute at the base, on a 3-4 lin. long petiole, 4-6 in. long, bluntish or bluntish and shortly acuminate, obsoletely crenate-serrate, chartaceous, glabrous, turning brownish in drying; cymes short and stiff, on a 3-4 lin. long peduncle, the dichotomous branchings much shortened and terminating in a dense head of rusty-coloured much-fringed bractlets from among which the terete 4-6 lin. long slender pedicels arise; flowers minute, hardly 2 lin. in diameter; sepals much imbricate and almost erect, more or less densely fringed; petals about ¾ lin. long, oblong, bluntish; stamens 3, the connective broad; filaments short, straight, terete; ovary 3-celled, the cells 2-ovuled.

HAB.—Tenasserim.—Fl. Jan.-March.

\* \* *Cymes sessile, i. e., the pedicels arising directly from a tubercle or wart.*

3. *S. grandiflora*, Kz.; H.f. Ind. Fl. i. 626.—A scandent shrub, all parts glabrous, the branchlets more or less terete, brown; leaves elliptically oblong or oblong, acute at the base, on a very thick  $\frac{1}{2}$ - $\frac{3}{4}$  in. long petiole, apiculate, entire, and the margins slightly revolute, 8-9 in. long, almost coriaceous, glossy on both sides, glabrous, turning brown in drying; flowers conspicuous, on thick about 2 lin. long pedicels, arising by 2-4 from axillary or lateral minutely bracted tubercles; sepals broadly rotundate, glabrous, about a line long; petals sessile, rotundate, about 3-4 lin. long; stamens 3, inserted inside the disk; anthers on very short dilated and reflexed filaments; ovary smooth; style short.

HAB.—Tenasserim.

4. *S. verrucosa*, Wight.; H.f. Ind. Fl. i. 628.—A large scandent shrub, all parts glabrous, the branches rarely terete or obscurely 3-angular and (along with the more or less compressed branchlets) very rough from numerous small corky lenticels; leaves elliptically or oblong-lanceolate, acute at the base, on a thick 3-5 lin. long petiole, rather shortly and bluntish acuminate, 4-6 in. long, obsoletely and bluntish serrate, almost coriaceous, glabrous, glossy above, turning brownish in drying; flowers numerous, small, on slender about 6-7 lin. long pedicels arising from axillary or lateral brownish densely bracted tubercles; sepals rounded, entire; petals about a line long, oblong, blunt; disk annular, thick; anthers 3, on very short dilated reflexed filaments; ovary obscurely 3-angular, smooth; berries obovoid or almost globular, (unripe) the size of a bullet, with a thick coriaceous skin as in *S. Roxburghii*, 3-celled, with a single large seed in each cell.

HAB.—Frequent in the tropical forests of Martaban and Tenasserim.—Fl. Jan.-March; Fr. Apr.—s: l.—SS.—Metam.

5. *S. Roxburghii*, Wall.; H.f. Ind. Fl. i. 627.—A lofty woody climber, all parts glabrous, the stem about  $1\frac{1}{2}$  ft. in girth, the older branchlets sparingly sprinkled with pale-coloured lenticels; bark 2 lin. thick, dark-grey, rather smooth; cut red; leaves lanceolate or oblong-lanceolate, acute at the base, 4-5 in. long, on a 2-3 lin. long petiole, bluntish apiculate, entire or nearly so, almost coriaceous, glabrous, glossy above, turning brown or blackish in drying; flowers usually numerous, yellowish green or of a deep greenish-orange colour, on slender 6-8 lin. long pedicels arising from a bracted globular tubercle in the axils of the leaves; sepals short, rounded, ciliolate; petals sessile, rotundate, nearly a line long; stamens 3, the anthers on very short dilated and reflexed filaments; berries almost globose, the size of a small lime or smaller, dull-red, with a thick skin surrounding a soft gelatinous edible pulp, 2-3-celled, with a solitary large seed in each cell.

**HAB.**—Not unfrequent in the tropical forests of Martaban and Tenasserim; also Chittagong.—Fl. March.—s: l.—SS.—Metain.

**REMARKS.**—Wood reddish, the annual rings purplish.

6. *S. prinoides*, DC. ; H.f. Ind. Fl. i. 626.—A straggling small tree or rather large half-scandent shrub, all parts glabrous, the branchlets smooth, grey, more or less 4-cornered; leaves lanceolate to oblong-lanceolate, acute at the base, on a slender petiole 4-5 lin. long, shortly and bluntish acuminate, about  $1\frac{1}{2}$ -3 in. long, crenate-serrate, coriaceous, glossy above, turning glaucescent in drying; flowers small, dull yellowish green, on 4-6 lin. long rather straight pedicels, several together arising from an axillary tubercle; calyx-lobes rotundate, more or less puberulous along the borders; petals about a line long, broadly obovate or almost rotundate, contracted in a short claw, waved or almost entire; anthers 3, on short but slender terete filaments arising from the inner margin of the cup-shaped fleshy disk which almost completely encloses the 3-celled ovary already before fecundation; berries globose or nearly so, the size of a small cherry, red, glossy, with a thin skin, sappy, by abortion 1-celled and 1-seeded.

**HAB.**—Frequent in the tidal forests all along the coast from Chittagong and Pegu down to Tenasserim and the Andamans.—Fl. Jan. ; Fr. March-June.

7. *S. flavescens*, Kz.; H.f. Ind. Fl. i. 625.—A scandent shrub(?), all parts glabrous; leaves lanceolate, opposite or alternate, on a 3-4 lin. long, thick petiole, acuminate at both ends, entire or obscurely serrate, with the borders slightly revolute, thin coriaceous, 4-5 in. long, glabrous, glossy above, pale beneath, turning yellowish in drying; flowers minute, white, on 1-2 lin. long pedicels, arising from minutely bracted tubercles in the axils of the leaves or laterally; sepals oblong-lanceolate, bluntish; petals  $\frac{3}{4}$  lin. long, oblong, blunt; anthers 3, on very short dilated filaments; ovary smooth.

**HAB.**—Tenasserim.

8. *S. multiflora*, Wight.; H.f. Ind. Fl. i. 627.—Shrubby, glabrous; leaves broadly ovate-lanceolate, rounded at the base, slightly acuminate and blunt at the apex, coriaceous, quite entire, with the margins slightly revolute, 8-10 in. long by 4 broad, turning paler green in drying; pedicels numerous, from axillary tubercles, longer than the petioles; calyx deeply 5-cleft; petals orbicular; anther-cells placed transversely across the apex of the filament and opening outwards; ovules about 8 in each cell, in 2 collateral rows.—(After Wight.)

**HAB.**—Tenasserim.

*RHAMNACEÆ.*

Flowers regular, hermaphrodite, or rarely polygamous. Calyx 4-5-lobed or -cleft, the tube persistent and often adnate to the ovary or disk, valvate. Petals 4 or 5, alternating with the calyx-lobes, or none. Stamens 4 or 5, opposite to the petals if present; filaments filiform, rarely dilated; anthers small, often included in the petals, rarely exserted. Disk rarely wanting, usually filling the calyx-tube or lining it, or annular, rarely cup-shaped and free. Ovary more or less inferior, 3- (or rarely 2- or 4-) celled, with a solitary erect ovule in each cell; style short, with as many lobes as cells to the ovary. Fruit a drupe or capsule, the margin of the adnate calyx-base forming a ring at the base or round or at the summit of the fruit, the endocarp separating into as many cocci as cells, or forming a woody or bony 2-4-celled stone. Seeds solitary, erect, often arillate. Albumen fleshy or almost bony, rarely wanting.—Trees or shrubs, often climbing, very rarely herbs, with usually alternate simple leaves. Stipules usually present, but very deciduous, rarely spiny and persistent. Flowers small or minute, in cymes or umbel-like clusters, often collected in axillary or terminal compound cymes; racemes, or panicles.

A well-marked family, easily recognised from the allies by the stamens opposite the petals, from *Ampelideæ* by the drupaceous or capsular (never berried) fruit, the seed, and generally by the habit. The fruits of some *Rhamni* are violently purgative, while others yield good dyes, and those of some species of *Zizyphus* are edible. Only few of the species yield timber, which is only small.

\* *Drupe containing a solid 1-3-celled putamen. Ovary superior or half superior.*

× Drupe 1-celled and 1-seeded; leaves penninerved.

○ Nut produced in a long terminal wing, indehiscent . . . . .

○ ○ Nut wingless.

*Ventilago.*

Nut indehiscent, nearly entirely enclosed in the enlarged adnate calyx-tube . . . . .

*Apteron.*

Capsule lanceolate or urn-shaped, 2-valved . . . . .

*Smythæa.*

× × Drupes with a 1-3-celled putamen.

Leaves palmately 3-5-nerved . . . . .

*Zizyphus.*

Leaves penninerved . . . . .

*Berchemia.*

\* \* *Fruit dry or drupaceous, containing 3 (rarely 2-4) indehiscent or 2-valved cocci.*

○ Fruit not winged, terete or nearly so.

× Leaves opposite or nearly so.

Flowers in fascicles or small umbels . . . . .

*Scutia.*

Flowers in terminal panicles . . . . .

*Sageretia.*

× × Leaves alternate; ovary confluent with the disk

*Colubrina.*

○ ○ Fruit usually 3-winged or 3-cornered; flowers

spicate-racemose; leaves alternate

*Gouania.*

## VENTILAGO, Gaertn.

Calyx 5-cleft, the tube obversely conical. Petals 5, hood-shaped, deflexed. Stamens 5, adnate to the base of the petals, the connective usually excurrent. Disk 5-cornered, flat, filling the calyx-tube. Ovary immersed in the disk, 2-celled; style very short with 2 stigmas. Nut almost globular, at the base or to the middle enclosed in the calyx-tube, 1-celled and 1-seeded, at the summit produced in a long wing. Albumen none.—Scandent shrubs with alternate penninerved leaves. Stipules very minute, deciduous. Flowers small, in terminal or axillary panicles.

\* *Fruiting calyx very short, surrounding only the very base of the nut; inflorescence tomentose* . . . } *V. Maderaspatana*.

\*\* *Fruiting calyx adnate to the middle of the nut, and forming here a prominent ring.* . . . } *na.*

Flowers racemoso-panicled, like the whole inflorescence tomentose;

fruits shortly, but densely puberulous . . . } *V. calyculata*.

Flowers glabrous, in axillary clusters, forming terminal, leafy, glabrous racemes; fruits quite glabrous and glossy; calyx-ring at the middle of the nut; nut 3 lin. thick, the wing rounded. *V. leiocarpa*.

As former, but nut nearly  $\frac{1}{2}$  in. thick, the calyx-ring basal, the wing shortly acuminate . . . } *V. Maingayi*.

1. *V. Maderaspatana*, Gaertn.; H.f. Ind. Fl. i. 631; Brand. For. Fl. 96.—A scandent shrub, thinly and shortly puberulous or glabrescent; leaves ovate-oblong to oblong-lanceolate, on short but slender puberulous petioles, bluntish and shortly acuminate, coarsely but obsoletely crenate-serrate, almost coriaceous, 1-2 $\frac{1}{2}$  in. long; flowers minute, greenish, on slender puberulous pedicels, in short clusters arranged into racemes forming shortly tomentose terminal panicles; calyx about 1 $\frac{1}{2}$  lin. in diameter; nuts the size and shape of a pea, at the base surrounded by the comparatively short calyx, shortly puberulous, terminating in an elliptically oblong 1 in. long wing.

HAB.—Tenasserim, from Moulmein down to Mergui.

2. *V. calyculata*, Tul.; H.f. Ind. Fl. i. 631; Brand. For. Fl. 96.—A large climbing shrub, remaining low and shrubby in dry situations, all younger parts pubescent or tomentose, the stems as thick as the arm; bark 1-2 lin. thick, reddish and olive-green, net-veined, slightly fissured; cut greenish; leaves ovate-oblong or oblong, shorter or longer petioled, about 3-4 in. long, shortly acuminate, crenate-serrate, tomentose while young, more or less glabrescent on both sides; flowers greenish, tomentose, minute, on 1-2 lin. long rather thick pedicels, densely clustered, in shorter or longer racemes forming terminal greyish or more usually pale tawny tomentose leafless panicles; calyx about 2 lin. in diameter; petals cuneate, crenulate at the blunt apex; nuts globular, the size

of a pea, to about its middle surrounded by the adnate calyx and there marked by a prominent ring (indicating the remains of the calyx-limb), shortly yellowish puberulous, at the top prolonged in a flat, linear-oblong, coriaceous, blunt or almost retuse wing of about 1-1½ in. in length.

HAB.—Not unfrequent in the open, especially the Eng forests, and in the dry forests of Prome, Pegu, and Martaban; also in Ava.—Fl. Nov.; Fr. March-Apr.—l. or s: l.—SS = petrophilous *imperum*.

REMARKS.—Wood coarse, fibrous, yellowish or brownish yellow, rather heavy, perishable.

3. *V. leiocarpa*, Bth.; H.f. Ind. Fl. i. 631.—A scandent shrub, all parts glabrous; leaves ovate-oblong or ovate-lanceolate, on a short and rather thick petiole, 3-3½ in. long, shortly and bluntish acuminate, crenate-toothed, glabrous; flowers small, glabrous, on 1-2 lin. long quite glabrous pedicels, clustered and forming leafy, more or less puberulous or almost glabrous simple racemes in the axils of the leaves and at the end of the branchlets; calyx nearly 2 lin. in diameter, glabrous; nuts globular, the size of a small pea, quite glabrous, to the middle surrounded by the adnate calyx, and forming there a raised ring, at the apex produced in an oblong-lanceolate almost chartaceous glossy blunt wing of about 2 in. in length.

HAB.—Tenasserim.

4. *V. Maingayi*, Laws. in H.f. Ind. Fl. i. 631.—An evergreen climbing shrub, all parts glabrous; leaves oblong-lanceolate to oblong, blunt or almost notched, 4-7 in. long, shortly petioled, entire, coriaceous, glabrous, with about 10 lateral nerves on each side; flowers in long, filiform, simple or compound racemes; fruits glabrous and almost polished; the nut globular, nearly ½ in. in diameter, blackish, the calyx forming a large basal adnate disk, the wing 2-2½ in. long, oblong-lanceolate, shortly acuminate.

HAB.—Tenasserim.

## APTERON, Kz.

Calyx 5-cleft, with a short obversely conical tube. Petals 5, minute, inserted between the calyx-lobes. Stamens 5, the filaments filiform. Disk flat, free. Ovary immersed in the disk, 2-celled; style very short with 2 short stigmas. Nut globular, quite enclosed in, and adnate to, the enlarged calyx, crowned by the annular calyx-limb, not winged, 1-celled and 1-seeded.—Scandent shrubs, with alternate penninerved leaves. Flowers small, clustered, forming racemose panicles.

1. *A. lanceolatum*, Kz.; H.f. Ind. Fl. i. 643.—A large scan-

dent shrub, the young shoots puberulous; leaves lanceolate, on a thick, puberulous and glabrescent petiole 2-3 lin. long, long and bluntish acuminate, serrate, chartaceous, 4-5 in. long, tawny puberulous on the nerves, soon glabrous; flowers small, on a line long puberulous pedicels, clustered or almost solitary, in racemes forming terminal and axillary greyish or yellowish pubescent panicles; calyx densely or slightly puberulous, about  $1\frac{1}{2}$ -2 lin. in diameter; ovary pubescent; nuts (drupaceous(?), globular, unripe the size of a pepper-kernel, enclosed in the glabrescent enlarged calyx to nearly to the apex, and there surrounded by the remains of the calyx-limb.

HAB.—In the tropical forests of the eastern slopes of the Pegu Yomah (Yainoay ehg.) and Upper Tenasserim.—Fl. Febr.; Fr. March-Apr.

### SMYTHEA, Seem.

Calyx 5-lobed, the tube obversely conical. Petals 5, hood-shaped. Stamens 5, free; anthers didymous. Disk 5-angular, rather flat. Ovary half-inferior, 2-celled; styles 2, recurved. Capsule compressed, but wingless, at the very base supported by the calyx, dehiscing along the middle into 2 valves, 1-celled and 1-seeded. Albumen none.—Scandent shrubs, with alternate penninerved leaves. Flowers small, clustered, racemose, forming panicles.

1. *S. calpicarpa*, Kz.; H.f. Ind. Fl. i. 632.—A scandent evergreen shrub, the branchlets tawny pilose; leaves lanceolate, on a thick, more or less pilose petiole  $\frac{1}{2}$ -1 lin. long, acuminate, serrate, chartaceous, 4-3 $\frac{1}{2}$  in. long, pilose along the midrib beneath, the rest glabrous; capsules (unripe)  $1\frac{1}{4}$  in. long, oblong, obliquely truncate at the top, densely tawny puberulous, coriaceous.

HAB.—Tenasserim (or Andamans?).

### BERCHEMIA, Neck.

Calyx 5-cleft, the tube hemispherical or turbinate. Petals 5, hooded. Stamens 5, the filaments filiform. Disk filling the calyx-tube, the margins free. Ovary immersed in the disk, free, 2-celled, narrowed in a 2-cleft style. Drupe more or less oblong, at base supported by the small calyx-tube, containing a crustaceous or woody 2-celled putamen. Albumen fleshy.—Erect or more usually scandent shrubs, with alternate penninerved leaves usually glaucous beneath. Flowers small, solitary or clustered, in racemose, terminal and axillary panicles.

1. *B. floribunda*, Brongn.; H.f. Ind. Fl. i. 637; Brand. For. Fl. 91.—A large scandent shrub, all parts glabrous; leaves elliptically to oblong-ovate, on a slender  $\frac{1}{2}$ -1 in. long petiole, rounded at the base,  $1\frac{1}{2}$ -3 in. long, shortly and abruptly acuminate, chartaceous,

entire, glabrous, glaucescent beneath, the lateral nerves numerous and parallel; flowers small, on a lin. long slender pedicels, clustered racemose, forming glabrous panicles in the axils of the upper leaves and at the end of the branchlets; calyx glabrous, about 2 lin. across; drupes ovoid-oblong, slightly compressed, about  $\frac{1}{2}$  in. long or somewhat longer, bluish-black, smooth or pruinous, containing a woody 2-celled putamen.

HAB.—Ava, Khakyen hills.—Fl. Aug.

### ZIZYPHUS, Juss.

Calyx 5-lobed, the tube broadly obversely conical. Petals 5 (rarely none), hooded. Stamens 5, the filaments subulate. Disk flat, filling the short calyx-tube, the borders free. Ovary immersed in the disk and at the base confluent with it, 2- (very rarely 3- or 4-) celled, with as many free styles or style-branches. Drupe fleshy, containing a woody or bony 1-3-celled and 1-3-seeded stone. Albumen none or scanty.—Trees or shrubs, sometimes climbing, armed with stipular sharp prickles. Leaves alternate, often oblique, palmately 3- or 5-nerved. Flowers small, in axillary cymes, sometimes paniced.

× Leaves beneath more or less pubescent or tomentose.

○ Cymes long-peduncled, forming large terminal and lateral tomentose panicles; leaves large, densely tawny tomentose beneath . . . . . *Z. rugosa*.

○○ Flowers in axillary short cymes or clusters.

Climber or straggling shrub; leaves usually acuminate; drupes the size of a small pea or pepper-kernel; putamen usually 1-celled . . . . . *Z. ænoplia*.

Tree or erect shrub; leaves usually blunt; drupes the size of a cherry; putamen 2-celled . . . . . *Z. jujuba*.

× × Leaves quite glabrous or nearly so; drupes while young tomentose or pubescent . . . . . *Z. glabra*.

1. *Z. rugosa*, Lamk.; H.f. Ind. Fl. i. 636; Bedd. Sylv. Madr. 68; Brand. For. Fl. 89.—*Myouk-zee*.—A tree (20—30+8—18+1½—3), armed with recurved, short, but strong stipular prickles (usually solitary by abortion), shedding leaves in H.S., all younger parts densely tawny tomentose; leaves ovate or ovate-oblong, rounded or obtuse at the more or less oblique 3- or 5-nerved base, on a 3-6 lin. long, thick, tomentose petiole, 5-6 in. long, acute, serrulate, almost coriaceous, densely tawny villous beneath; flowers small, tomentose, greenish, on 2-3 lin. long tomentose pedicels, forming long-peduncled cymes arranged into tomentose ample panicles at the end of the leafless branchlets; calyx tomentose, 2½ lin. in diameter; ovary and young fruit fugaceously pubescent; drupes the size of a small cherry, obversely turbinate or pear-shaped, yellowish, with a thin smooth epicarp surrounding the woody usually 1-seeded stone.

HAB.—Frequent all over Burma from Ava and Martaban down to Tenasserim, in all leaf-shedding forests, more especially in the open forests, but rare in the alluvium.—Fl. March-Apr.; Fr. May.—L.—SS.—∞.

2. *Z. jujuba*, Lamk.; H.f. Ind. Fl. i. 632; Bedd. Sylv. Madr. t. 149; Brand. For. Fl. 86, t. 17.—*Zee-pen*.—A leaf-shedding or an evergreen tree (25—30+10—15+2—3), remaining often stunted or shrubby, armed with thin, short, usually paired stipular prickles (one of the pair curved, the opposite one short and straight), rarely almost unarmed, all younger parts whitish or tawny tomentose; bark  $\frac{1}{2}$  in. thick, dark-brown, longitudinally furrowed and fissured and horizontally cracked, brittle, fibrous; cut reddish; leaves from oblong and ovate to almost rotundate, slightly or not unequal at the 3-nerved base, on a 3-6 lin. long densely tomentose petiole, blunt, serrulate, 1-2-3 in. long, almost coriaceous, above glabrous with the exception of the principal nerves, densely greyish or tawny tomentose beneath; flowers small, greenish, on rather long shortly tomentose pedicels, forming small, lax or dense, almost sessile, greyish-tomentose cymes in the axils of the leaves; calyx about 2 lin. in diameter, tomentose; ovary glabrous, 2-celled; styles 2, united to the middle; drupes globose or oblong, the size of a cherry or much smaller, yellow or orange-yellow, edible, containing a wrinkled, woody, usually 2- rarely by abortion 1-celled stone.

HAB.—In leaf-shedding forests, especially in the dry and savannah forests, common in Prome and Ava, less so over the other provinces; also frequently cultivated in and around villages.—Fl. Aug.-Sept.; Fr. Octob.-Jan.—L.—SS.—∞ *CaS*.

REMARKS.—Sap-wood yellowish, heart-wood dark-brown, fine and close-grained, strong and hard. Good for cabinet-work. Gives good charcoal. Bark good for tanning. Lac is found on it.

3. *Z. ænopia*, Mill.; H.f. Ind. Fl. i. 634; Bedd. Sylv. Madr. 69; Brand. For. Fl. 86.—*Taw-zee-nway*.—A large often lofty scandent shrub, remaining shrubby and erect in barren situations, armed with sharp but short solitary or paired stipular prickles (one of them straight, the other curved), all softer parts more or less densely appressed pubescent or villous; leaves ovate-lanceolate or ovate, usually very oblique, 3- rarely 5-nerved at the base, acute or acuminate, rarely blunt, on a short but slender tomentose petiole,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, crenulate-serrate or almost entire, membranous, appressed pubescent on both surfaces, more so beneath, and here often almost villous; flowers small, greenish yellow, on 1-1 $\frac{1}{2}$  lin. long slender pedicels, forming small, poor or crowded, almost sessile or shortly peduncled cymes in the axils of the leaves; calyx about a line in diameter, puberulous or pubescent; the sepals ovate, acuminate; petals obovate, narrowed at base, embracing the filament; disk 10-crenate; ovary glabrous, 2-celled; drupes elliptical or

almost globular, the size of a small pea or pepper-kernel, black, smooth, edible, containing a 2- or by abortion often 1-celled thin wrinkled nut.

HAB.—Very frequent in all forests, evergreen as well as leaf-shedding, also in savannahs, shrubberies, &c., all over Burma and adjacent provinces down to the Andamans.—Fl. Sept.-Octob. ; Fr. C. S.—s: 1. and 1.—SS.=∞.

4. *Z. glabra*, Roxb.—A lofty glabrous scandent shrub, armed with short but sharp-curved usually solitary prickles, the young shoots slightly and shortly puberulous; leaves ovate to ovate-oblong, rarely ovate-lanceolate, not or slightly oblique, 3-nerved, on a very slender 3-4 lin. long glabrous or puberulous petiole, shortly bluntish acuminate, serrulate, chartaceous, quite glabrous, elegantly transversely veined; flowers small, on slender about 2 lin. long puberulous pedicels, forming short-peduncled puberulous cymes in the axils of the leaves and about twice so long as the petioles; calyx shortly pubescent, about 2 lin. in diameter; ovary pubescent; drupes globular or nearly so, the size of a large pea, while young densely pubescent, afterwards tawny-velvety or almost glabrescent, yellow, sappy, containing a smooth, thin, bony stone usually 1-celled by abortion.

HAB.—Frequent in the tropical forests from Chittagong and Ava down to Tenasserim and the Andamans.—Fl. Febr.-March; Fr. Apr.—s: 1.—SS.=petrophilous.

### SAGERETIA, Brongn.

Flowers hermaphrodite. Calyx 5-cleft, the tube hemispherical or ureolate. Petals 5, hooded. Stamens 5. Disk cup-shaped, with a free 5-lobed margin, filling the calyx-tube. Ovary immersed in the disk, free, 3-celled; style short, with 3 stigmas. Drupe containing 3 indehiscent coriaceous pyrenes. Albumen thin.—Unarmed or spinose shrubs, with opposite or almost opposite penninerved leaves. Stipules minute, deciduous. Flowers small, in axillary spikes or clusters, or panicled.

1. *S. theezans*, Brongn.; H.f. Ind. Fl. i. 641; Brand. For. Fl. 95.—An unarmed or slightly armed shrub, the young shoots slightly tawny pubescent; leaves elliptical to oval-oblong, rounded or obtuse at the base, on a slender puberulous petiole 2-3 lin. long, blunt or rounded at apex,  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long, entire, membranous, while young slightly hirsute along the midrib beneath, soon quite glabrous, pale beneath; flowers small, sessile, in short small axillary spikes; calyx minute; petals glabrous,  $\frac{1}{2}$  lin. long.

HAB.—Ava.—Fl. Octob.

## SCUTIA, Comm.

Flowers hermaphrodite. Calyx 5-cleft, the tube hemispherical or turbinate. Petals 5, flat or hooded. Disk filling the calyx-tube, the margins free and waved. Stamens 5. Ovary immersed in the disk, free, 2-4-celled; style short, 2-3-cleft. Drupes dry or fleshy, containing 2-4 crustaceous pyrenes. Albumen none or scanty.—Spiny or unarmed shrubs, with opposite or almost opposite penninerved leaves. Flowers axillary, in clusters or small umbellets.

1. *S. Indica*, Brongn.; H.f. Ind. Fl. i. 640.—A wild straggling shrub, armed with opposite sharp curved spines, all parts glabrous; leaves almost alternate, obovate to oblong, on a short slender petiole, acute at the base, 1-2 in. long, retuse, blunt or acute, thinly coriaceous, entire or serrulate upwards, glabrous, shining above; flowers yellowish-green, small, on slender a line long pedicels, forming a few-flowered very small glabrous umbellet in the axils of the leaves; berries depressed globular, the size of a pea, smooth.

IIAB.—Upper Tenasserim, along the Attaran.

## COLUBRINA, L. C. Rich.

Calyx 5-cleft, the tube hemispherical. Petals 5, hooded. Stamens 5. Disk thick, annular, 5-10-lobed or 5-cornered, filling the calyx-tube. Ovary immersed in the disk and confluent with the same, 3-celled, the style short, 3-cleft or 3-parted. Drupe obsoletely 3-lobed, up to near  $\frac{1}{2}$  surrounded by the calyx-tube, containing 3 cocci often capsule-like separating and loculicidally dehiscent. Albumen fleshy, but thin.—Scandent or erect shrubs, with alternate penninerved leaves 3-nerved at base. Stipules small, deciduous. Flowers small, in axillary cymes or clusters.

Leaves and cymes glabrous . . . . . *C. Asiatica*.  
Cymes and leaves (at least beneath) tawny pubescent . . . . . *C. pubescens*.

1. *C. Asiatica*, Brongn.; H.f. Ind. Fl. i. 642; Bedd. Sylv. Madr. 69, t. 10, f. 5.—*Kuay-nway*.—A large unarmed spreading shrub, often scandent, all parts glabrous; leaves ovate or ovate-lanceolate, on a slender, more or less puberulous petiole 6-10 lin. long, acuminate,  $2\frac{1}{2}$ -4 in. long, crenate-serrate, membranous, glabrous; flowers small, pale-greenish, on 3-4 lin. long slender pedicels, forming short, almost sessile or shortly peduncled, glabrous cymes in the axils of the leaves; calyx about  $1\frac{1}{2}$  lin. in diameter; drupes 3-lobed-globose, the size of a large pea, pale-brown, supported by the circularly-truncate calyx-tube, 3-coccous.

HAB.—Frequent in the beach- and coast-forests along the sea-shores from Arracan down to Tenasserim and the Andamans.—Fl. Febr ; Fr. March-Apr.—l.—SS.= Aren. All.

2. *C. pubescens*, Kz. ; H.f. Ind. Fl. i. 642.—A large leaf-shedding scandent shrub, unarmed, all younger parts densely tawny pubescent ; leaves as in preceding, but densely tawny pubescent while young, glabrescent above ; flowers small, greenish, on slender, a line long, pubescent pedicels, forming short, thick, tawny pubescent cymes in the axils of the leaves ; drupes smaller than those of the preceding species.

HAB.—Frequent in the open, especially the low forests (and entering also the tropical forests) all over Pegu and Martaban.—Fl. March ; Fr. Apr.-May.—s : l.—SS.= petrophilous, Arg.

## GOUANIA, L.

Flowers polygamous. Calyx 5-lobed, the tube short, obversely conical, adhering to the ovary. Petals 5, hooded. Stamens 5. Disk filling the calyx-tube, 5-angular or produced into 5 horns. Ovary immersed in the disk, 3-celled ; style 3-parted or 3-lobed. Fruits coriaceous, inferior, crowned with the persistent calyx-limb, 3-winged, containing 3 almost woody indehiscent cocci separating from the 6-parted axis. Albumen scanty.—Shrubs, usually scandent, bearing tendrils, with alternate penninerved leaves often 3-nerved at the base. Stipules oblong, deciduous. Flowers small, in axillary or terminal racemes or spikes, the rachis often transformed into a tendril.

Leaves, etc., glabrous or nearly so, the former crenate-serrate ; disk glabrous, 5-horned ; capsules glabrous, c. 5 lin. long . . . *G. leptostachya*.  
All softer parts rusty-tomentose ; leaves entire ; capsules 3-4 lin. long, puberulous, glabrescent. . . . . *G. Brandisii*.

1. *G. leptostachya*, DC. ; H.f. Ind. Fl. i. 643.—*Ta-yaw-nyo-nway*.—A large scandent tendril-bearing shrub, the young shoots slightly pubescent, the stems about 2 in. thick ; bark grey, spongy, tortuously fissured ; leaves ovate- or oblong-ovate, on a long and slender petiole, about 3-4 in. long, acuminate, coarsely crenate-serrate, glabrous or sparingly sprinkled with short appressed hairs along the nerves beneath ; flowers small, yellowish, on short sparingly pubescent pedicels, forming slender, elongate, puberulous, soon quite glabrescent racemes in the axils of the leaves and at the end of the branchlets ; disk glabrous, cup-shaped, expanded into 5 short spreading notched horns ; drupes capsular, coriaceous, with 3 rounded short wings, glabrous, 3-valved, containing 3 shining seeds.

HAB.—Frequent in the mixed forests and in shrubberies around villages and along streams all over Burma down to Tenasserim.—l.—Fl. close of R.S. ; Fr. C.S.—SS.=∞.

2. *G. Brandisii*, Hassk.—A large woody tendril-bearing climber, all softer parts densely rusty-tomentose or villous; leaves cordate-ovate, on a more or less tomentose 3 lin. to nearly an inch long petiole,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. long, acute or acuminate, quite entire, shortly pubescent above, densely tawny (on the nerves rusty) pubescent beneath; racemes axillary and terminal, rusty or tawny tomentose, often panicle at the end of the branches; flowers...; drupes capsular, 3-4 lin. long, with 3 rounded glabrous wings, minutely puberulous, 3-1 valved, containing 3 glossy seeds.

Han.—Not unfrequent in the tropical forests of Martaban and Tenasserim.—Fr. Febr.-March.—H: L.—SS.=Metam.

### AMPELIDEÆ.

Flowers regular, hermaphrodite or unisexual. Calyx entire or 4-5-toothed. Petals 4 or 5, free or cohering, valvate. Stamens 4 or 5, opposite to the petals, inserted outside of the disk. Disk free or adnate to the ovary. Ovary more or less perfectly 2-6-celled, with 1 or 2 erect ovules in each cell. Fruit a berry, the dissepiments frequently disappearing. Seeds 1-6. Albumen ruminant.—Woody or herbaceous climbers or rarely erect shrubs or small trees, the branches often jointed. Leaves alternato or opposite, simple or compound, the petiole expanded in a membranous stipule. Flowers small, in leaf-opposed or axillary inflorescences, never solitary or clustered.

*Ampelideæ* are very nearly allied to *Rhamneæ*, but easily recognised by the more developed petals, the berry-like fruits, and general habit. The grape is too well known to need further remarks, but the rest of vines are of little or no importance to the forester. Many of these climb the loftiest trees with their tow-shaped stems and form part of the so-called lianes of tropical forests. I have given all the species in the following analytical keys, but describe only such of them as are woody to a certain degree.

Stamens free; tendril-bearing climbers	<i>Vitis</i> .
Petals and stamens united with the disk; erect shrubs or trees.	<i>Leea</i> .

### VITIS, L.

Calyx entire or lobed. Petals 4 or 5, free or cohering with their tips. Disk various or obsolete. Stamens 4 or 5, free. Ovary 2 (rarely 3-4)-celled with 2 ovules in each cell. Berry 1-2-celled.—Tendril-bearing climbers, rarely herbaceous, with simple or compound leaves. Flowers small, in axillary or leaf-opposed inflorescences.

\* *Flowers in leaf-opposed or axillary cymes.*

× *Style or stigma 4-lobed or 4-parted.*

+ *Stigma sessile, 4-lobed or 4-parted. Flowers sometimes unisexual, Cymes axillary, rarely leaf-opposed. Leaves compound.*

All parts glabrous (or the petioles and cymes often puberulous); leaves pedate or the upper ones often 3-foliate, sappy-coriaceous; berries the size of a cherry, white; stem usually tubercled . . . . . *V. lanceolaria.*

All parts and the very short cymes glabrous; leaves 3-foliate, sappy-herbaceous; pedicles short, cymulose; berries pea-shaped, white . . . . . *V. angustifolia.*

All parts glabrous; leaves pedate, herbaceous; pedicels 2-3 lin. long, umbellate; berries blackish . . . . . *V. capreolata.*

Young shoots and petioles rusty-hirsute; leaves digitate; rest as above . . . . . *V. obtecta.*

+ + *Style short, 4-lobed at apex, the lobes spreading. Flowers unisexual or hermaphrodite.*

Hermaphrodite; leaves coriaceous, 3-foliate . . . . . *V. assimilis.*

Flowers unisexual; leaves membranous, 3-foliate . . . . . *V. oxyphylla.*

× × *Style and stigma simple.*

‡ *Leaves variously compound.*

+ *Leaves pedate,*

‡ *Cymes axillary, long-peduncled.*

All parts pubescent or almost glabrous; leaflets finely acuminate *V. pedata.*

Leaflets cuneate-obovate, rather blunt or acute, slightly pubescent along the nerves beneath. . . . . *V. tenuifolia.*

‡ ‡ *Cymes leaf-opposed and spuriously axillary, i. e., the cyme at the end of an axillary leaved or leafless shoot.*

All parts glabrous; leaves along the nerves beneath sparingly pubescent . . . . . *V. Japonica.*

All parts densely puberulous or pubescent . . . . . *V. Teysmanni.*

+ + *Leaves all 3-foliate.*

All parts shortly puberulous; cymes axillary or on axillary shoots, puberulous . . . . . *V. trifolia.*

All parts glabrous, the cymes leaf-opposed, glabrous; leaves glaucous beneath . . . . . *V. Himalayana.*

+ + + *Leaves digitate.*

All parts puberulous; cymes axillary or terminal on axillary shoots; leaflets 1½-2 in. long . . . . . *V. auriculata.*

Leaves glabrous; leaflets 4-6 in. long, herbaceous; cymes puberulous; berries globular . . . . . *V. erythroclada.*

Leaves glabrous; leaflets 4-6 in. long, coriaceous; cymes puberulous, very slender; berries coffee-bean-shaped and somewhat curved . . . . . *V. campylocarpa.*

‡ ‡ *Leaves simple. Cymes leaf-opposed.*

‡ *Branches and branchlets cornered, sometimes almost winged and fleshy.*

Branchlets very fleshy, 4-cornered, jointed; leaves small, fleshy, bluntish crenate; cymes simple . . . . . *V. quadrangularis.*

Branchlets sharply 6-cornered; leaves bristly serrate, herbaceous; cymes compound, peduncled or sessile . . . . . *V. discolor.*

Branchlets bluntish 5-angular, thick and glossy; leaves remotely bristly toothed, long-petioled . . . . . *V. pentagona.*

‡ ‡ *Branches and branchlets terete or nearly so; berries often nodding.*

Branchlets terete, whitish pruinous; all parts glabrous . . . . . *V. repens.*

- All parts, especially while young, rusty or tawny tomentose or pubescent, more or less glabrescent; leaves sharply acuminate, never lobed . . . *V. adnata*.
- All younger parts rusty-tomentose or pubescent, glabrescent; leaves large, often somewhat 3-lobed, bluntish acuminate . . . *V. Linnæi*.
- As former, but cymes axillary . . . *V. Wallichii*.
- \* \* Flowers 4- or 5-merous, in cymose panicles, racemes, spikes, or more usually the one or both tendril-branches transformed in a panicle.
- × Flowers pedicelled.
- Branchlets; peduncles, and usually the petioles covered with a woolly tomentum intermixed with black, spreading, stiff hairs . . . *V. barbata*.
- Branchlets glabrous; cymose panicles ample, glabrous, with or without tendrils; pedicels thick, nearly a line long; leaves 3-5-lobed, the lobes usually acute . . . *V. latifolia*.
- Branchlets, etc., woolly; leaves lobed or palmately lobed; panicles usually tendril-bearing, short and rather compact; pedicels very short and thick . . . *V. tomentosa*.
- Branchlets, etc., woolly; leaves tawny woolly beneath, not or slightly lobed; panicles usually tendril-bearing, woolly, large and lax; pedicels 1½ lin. long, very slender . . . *V. lanata*.
- × × Flowers sessile, in panicle spikes.
- Leaves pedately 5-foliolate; spikes panicle, like the branchlets, etc., rusty-tomentose . . . *V. Helferi*.
- All parts quite glabrous; leaves coriaceous, digitate; flowers spikeate, forming very long, glabrous panicles . . . *V. polystachya*.

\* Flowers in leaf-opposed or axillary cymes.

× Style or stigma 4-lobed or 4-parted.

1. *V. lanceolaria*, Wall.; H.f. Ind Fl. i. 660; Brand. For. Fl. 101.—*Kyee-nee-nway* or *kyee-chee-nway*.—A large woody evergreen climber, the stems and often also the branchlets and petioles corky-tubercled, all parts glabrous, rarely the shoots puberulous; tendrils simple, glabrous; leaves pedately 5-foliolate, those of the shoots occasionally 3-foliolate, glabrous, on a 3-4 in. long glabrous or puberulous petiole; leaflets lanceolate or oblong-lanceolate, on a 3-4 lin. long, thick, glabrous or puberulous petiolule, the lateral ones more or less oblique and unequal, 4-6 in. long, acute at the base longer or shorter bluntish acuminate, remotely serrate-toothed, almost fleshy, fleshy coriaceous and glossy while fresh; cymes short or ample, axillary or rarely almost leaf-opposed, bracted, puberulous, branched; flowers dioecious, small, greenish white, on shorter or longer puberulous pedicels; flower-buds 4-horned; calyx almost entire, very short; petals 4, puberulous outside; stamens 4, the filaments filiform; stigma short, sessile or nearly so, 4-lobed; berries globose or depressed globose, the size of a cherry, glossy, of a watery flesh-colour or white, containing 1-4 seeds nearly 4 lin. long.

HAB.—Common in the tropical forests all over Martaban and Tenasserim down to the Andamans; also along the eastern slopes of the Pegu Yomah.—Fl. Febr.-March; Fr. Apr.-May.—s: 1.—SS.—petrophilous.

2. *V. assimilis*, Kz.—A glabrous woody climber with terete tubereled branches; leaves constantly 3-foliolate, on a 1-1½ in. long petiole; leaflets on very short thick petiolules up to a lin. long, oblong-lanceolate (the lateral ones oblique and rounded at the one side of the unequal base), 3-4 in. long, acute, crenate-toothed, coriaceous, glabrous; flowers small, greenish-white, hermaphrodite, on a line long, thick, densely tawny puberulous pedicels, forming short-peduncled usually nodding much-branched puberulous cymes in the axils of the leaves; petals 4; ovary narrowed in a short thick style terminated by 4 short spreading lobes.

HAB.—Not unfrequent in the drier hill forests of the Martaban hills east of Tounghoo, at 3,500 to 4,000 ft. elevation.—Fl. March.—s.—SS.—Metam.

×× *Style and stigma simple.*

3. *V. pedata*, Wall.; H.f. Ind. Fl. i. 661.—A woody climber bearing leaf-opposed, simple or 2-elft tendrils, all parts glabrous or softly pubescent; leaves pedately 5- rarely 7-11-foliolate, on a 2-3 in. long petiole; leaflets oblong-lanceolate or ovate-oblong, the lateral ones usually more or less oblique and unequal, about 4-6 in. long, shortly but sharply acuminate, bluntish and remotely serrate-toothed, membranous, beneath or on both surfaces more or less pubescent or quite glabrous; stipules cordate, acute, caducous; flowers small, greenish-white, on 1-2 lin. long slender puberulous or glabrous pedicels, forming axillary long-peduncled glabrous or densely pubescent corymbose cymes of about the length of the petiole; calyx conspicuous, truncate; petals 4, about 1½ lin. long; disk large, 4-lobed; stamens 4; the filaments slender; style simple, filiform; berries depressed-globose, about the size of a large pea, obscurely 4-lobed, smooth, white, 4-seeded.

HAB.—Frequent in the mixed forests, in hedges and amongst shrubberies, all over Burma down to Tenasserim and the Andamans.—Fl. Begin. of R.S.—1xs.—SS.=∞.

4. *V. Himalayana*, Brand. For. Fl. 100; H.f. Ind. Fl. i. 655.—A glabrous woody climber with terete lenticellate branchlets; leaves 3-foliolate, the petiole up to 6 in. long; leaflets as long as the petiole, unequal at the base, obliquely ovate-oblong (the terminal one almost oblong), on 3-4 lin. long petiolules, caudate-acuminate, coarsely crenate-toothed, membranous, glabrous, glossy above, beneath glaucous and net-veined; flowers small, greenish-white, on short thick pedicels, forming glabrous peduncled dichotomously branched cymes arising opposite the young leaves on the annual shoots or shooting out from the older branches; calyx truncately 4-lobed, short; petals 5, oblong, hooded, acute; ovary ovate with a very short simple style thickened at the apex; berries the size of a small pea, smooth, 1-2-seeded.

HAB.—Not unfrequent in the drier hill forests of the Martaban hills, east of Tounghoo, at 3,000 to 5,000 ft. elevation.—Fl. March.—Fr.—SS.—Metam.

5. *V. auriculata*, Wall.; H.f. Ind. Fl. i. 658.—*Tin-noung-ping-nray*.—A large woody tendril-bearing climber, all parts pubescent, the stem about  $1\frac{1}{2}$  ft. in girth, terete; bark spongy and deeply cracked; tendrils 2-3-elft; leaves digitately 5-rarely 3-foliate, on a 2-3 in. long petiole, densely pubescent; leaflets obovate-oblong, more or less rhomboid, rather shortly petioluled, about 2-3 in. long, narrowed at the base, acute or acuminate, coarsely serrate-toothed, above minutely puberulous or smooth and shining, beneath shortly pubescent; stipules rather large, ear-shaped, falcate-oblong, blunt; flowers small, on  $1-1\frac{1}{2}$  lin. long strong puberulous pedicels, cymulose, forming a long-peduncled densely puberulous corymbose cyme at the end of the young axillary shoots; calyx short, truncate, puberulous; petals and stamens 4; style simple, subulate; berries almost globular, the size of a small cherry, smooth, red, containing a single obliquely obovate somewhat compressed seed.

HAB.—Not unfrequent in the tropical and moister upper mixed forests of the Pegu Yomah.—Fl. Begin. of R.S.—s: l.—SS.—SiS.

REMARKS.—Wood reddish, very coarsely fibrous.

6. *V. orythroclada*, Kz.—*Woon-oo-nray* or *myac-zoo-nray*.—A large leaf-shedding woody climber, the younger parts slightly pubescent, the branchlets reddish brown, terete; stem terete, as thick as the arm; bark  $\frac{1}{2}$ - $\frac{3}{4}$  in. thick, brown, coarsely longitudinally cracked; cut brown; tendrils 2-elft; leaves digitately 5-foliate, on a 4-5 in. long glabrous petiole; leaflets broadly obovate-oblong, on slender 1-2 in. long glabrous petiolules, acute at the base, 4-6 in. long, shortly acuminate, serrate, membranous, while young slightly pubescent along the nerves beneath, soon turning quite glabrous; flowers small, yellowish-green, on  $1\frac{1}{2}$ -3 lin. long puberulous pedicels, cymulose, forming rather short dichotomous puberulous and more or less glabrescent lax cymes; calyx short, puberulous; petals and stamens 4; style simple, subulate; berries globular, the size of a cherry.

HAB.—Not unfrequent in the tropical forests, especially along chonngs of the eastern slopes of the Pegu Yomah and Martaban.—Fl. March; Fr. May.—s: l.—SS.—SiS., Metam.

REMARKS.—Wood light-brown, fibrous, coarse.

7. *V. campylocarpa*, Kz.; H.f. Ind. Fl. i. 657.—A lofty woody climber with terete stems and strong leaf-opposed tendrils, all parts quite glabrous; leaves digitately 5 (to 7?)-foliolate, on 2-3 in. long smooth petioles; leaflets jointedly inserted on a  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long petiolule, obovate, tapering towards the acute base, the lateral ones

somewhat unequal, 4-6 in. long, abruptly acuminate, remotely and slightly crenate-toothed, succulent-coriaceous, glabrous; cymes axillary, dichotomously branched, very shortly peduncled or almost sessile, glabrous; berries the size and somewhat the shape of a coffee-bean, slightly curved, smooth and glossy, on a line long peduncle, containing a single coffee-bean-shaped sulcate transversely striate seed.

HAB.—In the tropical forests of the north-eastern slopes of Kambala toun, Pegu Yomah, at 1,000 ft. elevation.—Fr. March.

8. *V. pentagona*, Voigt.; H.f. Ind. Fl. i. 646.—A large glabrous climber, with thick succulent 5-angular glossy branches; leaves ovate or ovate-oblong, almost truncate or slightly sinuate at the base, acuminate, 3-5 in. long, on a 1-1½ in. long petiole, remotely bristly toothed, succulent-herbaceous, quite glabrous and shining; flowers small, yellowish, on thick pedicels a line or a little longer, forming simple or slightly compound glabrous leaf-opposed cymes; calyx truncate; petals 4, oblong-lanceolate, hooded, acuminate, nearly a line long; stamens 4; style short, simple; berries globular, the size of a small cherry, glossy black, containing usually 2 smooth compressed-convex orbicular-ovate seeds.

HAB.—Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah and Arracan; also in Chittagong and the Andamans.—Fl. Octob.; Fr. Apr.-May.—s: l.—SS.=SiS.—Chloritic rocks.

9. *V. repens*, W.A.; H.f. Ind. Fl. i. 646.—A large climber, the branches and branchlets terete or nearly so, more or less pruinous, the latter often white-mealy; tendrils leaf-opposed, 2-cleft; leaves simple, cordate or broadly cordate, rarely ovate-oblong, on long petioles, the larger lower ones usually angular, about 1½ to 3 in. long, acuminate, or occasionally almost blunt, bristly serrulate, membranous, glaucous green, glabrous; stipules oblong or oboval, blunt, green; flowers small, yellowish or reddish outside, on 2-3 lin. long slender pedicels, almost umbellate, forming a leaf-opposed umbellately branched longer or shorter peduncled glabrous cyme usually of the length of the leaves or shorter; calyx glabrous, short, obsolete 4-lobed; petals and stamens 4; disk 4-lobed, yellow; style simple, rather robust; berries globular, the size of a pea, turning purplish-black, smooth and glossy, usually 1-seeded.

HAB.—Frequent in the tropical and in the moister mixed forests all over Burma, from Ava and Chittagong down to Tenasserim and the Andamans.—Fl. R. S; Fr. C.S.—s: l.—SS.=∞.

10. *V. Linnæi*, Kz. (*V. repanda*, W.A.; H.f. Ind. Fl. i. 648). —*Yin-noung-nway*.—A large leaf-shedding climber, bearing simple or many-cleft tendrils on the young shoots, all younger parts covered with a fugaceous tawny or rusty-coloured wool or tomentum.

tum; stem somewhat compressed, corky, uneven, deeply and longitudinally cracked; leaves simple, on very long slender petioles, broadly cordate and usually somewhat angular or obsoletely lobed, about 5-6 in. long and nearly as broad, shortly and bluntish acuminate, remotely and bristly repand-serrulate, 5-nerved at the base, membranous, sparingly woolly (especially beneath), when full grown chartaceous and quite glabrous; stipules oblong, small; flowers small, reddish, drooping on long, slender, woolly glabrescent pedicels arising umbellately from rusty villous knobs and forming a leaf-opposed, sparingly woolly, glabrescent, divaricate, long-peduncled (2-2½ in.) cyme; calyx short, usually villous; petals and stamens 4; style simple, rather thick; berries all drooping, obovate, about the size of a small pea, purplish-black, smooth, 1-2-seeded.

HAB.—Frequent in the mixed forests as also in shrubberies and grass jungles all over Burma and adjacent provinces down to the Andamans.—Fl. Apr.-May; Fr. R.S.—s: 1.—SS.=∞.

\* \* *Flowers in cymose panicles, racemes, spikes, or more usually one or both tendril-branches transformed into a panicle.*

11. *V. barbata*, Wall.; H.f. Ind. Fl. i. 651.—A large woody climber, all parts, except the leaves, covered with copious, long, capitate, brown or blackish, stiff hairs; petioles long, covered with a woolly tomentum intermixed with long, spreading, blackish, stiff hairs; leaves simple, broadly or rounded-cordate, 5-6 in. long by 6-7 broad, strongly 5-nerved at the base, irregularly sinuate-toothed, not or obsoletely 3-lobed, while young covered with a loose very fugaceous tomentum, soon turning glabrous above and slightly woolly along the prominent nerves beneath, membranous; tendrils leaf-opposed, woolly, and beset with long stiff hairs, 2-3-cleft, the one branch transformed in a tomentose more or less elongate panicle, consisting of small racemulose flowers on very short, thick, tomentose pedicels; calyx short, obsoletely 4-lobed; petals and stamens 4 or 5 each, the former about a line long, glabrous; stigma sessile.

HAB.—Frequent in the low and lower mixed forests all over Ava and Martaban down to Tenasserim.—Fl. Apr.-May.—1.

12. *V. latifolia*, Roxb.; H.f. Ind. Fl. i. 652; Brand. For. Fl. 99.—*Chin-douk-nway-zouk*.—A large tendril-bearing climber, the younger parts pubescent, the branches and branchlets all glabrous; leaves simple, on a 2-4 in. long glabrous petiole, broadly cordate or rotundate, not or more usually 3-5-lobed with the lobes acute or rarely blunt, about 5-6 in. long and broad, acute or rarely blunt, irregularly serrate-toothed, membranous, or almost chartaceous, more or less pubescent along the nerves and veins beneath; flowers purplish, small, on about a line long glabrous pedicels, cymulose, forming an ample-branched glabrous cymose panicle terminating

one of the branches of the 2-cleft glabrous leaf-opposed tendril usually shorter than the leaves; calyx short, truncate, green; petals and stamens 5; stigma sessile; berries globular, the size of a small pea, purplish, smooth, usually 2-seeded.

HAB.—Frequent in the savannahs and savannah jungles, as also in shrubberies and woods round villages, all over the Pegu plains, especially in the Sittang valley.—Fl. Apr.-May.—SS.=All.

13. *V. tomentosa*, Heyne; H.f. Ind. Fl. i. 650.—A large tendril-bearing climber, all parts greyish or tawny woolly; leaves simple, on a slightly woolly petiole  $1\frac{1}{2}$  to 3 in. long, rotundate-cordate, 5-nerved at the base, 3-5-lobed or sometimes 3-5-parted, with the lobes more or less acute or rarely blunt, unequally toothed, 5-6 in. long and broad, acute, rarely blunt, membranous; flowers small, on very short and thick woolly petioles, reddish or purplish, compact and cymulose, forming a short usually very dense woolly corymb-like panicle on the one branch of the 2-3-cleft leaf-opposed slightly webby-woolly tendrils; calyx short, obsolete 5-lobed; petals and stamens 5; stigma sessile; berries the shape and size of a coffee-berry, reddish or purplish, smooth, usually 4-seeded.

HAB.—In deserted hill toungyas of the Martaban hills east of Tounghoo, at 3,000 to 4,000 ft. elevation.—Fl. & Fr. March.—SS.=Metam.

14. *V. lanata*, Roxb.; H.f. Ind. Fl. i. 651.; Brand. For. Fl. 99.—A large tendril-bearing climber, all younger parts softly tawny tomentose; leaves simple, on a 2-3 in. long usually glabrous petiole, broadly cordate or cordate-ovate, the larger ones occasionally angular, about 4-5 in. long, coarsely and unequally toothed, acuminate, almost chartaceous, glabrescent above, rusty or tawny tomentose beneath, rarely pubescent only along the nerves; flowers unisexual, small, greenish, on a line long capillary smooth pedicels, racemulose or almost cymulose, forming an elongate branched woolly panicle, of which usually the one or other branch remains reduced to a tendril; calyx short, 5-lobed; petals and stamens 5, the former calyptrate and very deciduous; filaments long and slender; stigma sessile; berries globular, the size of a small pea, dark-purple, smooth, containing usually 1 or 2 seeds.

HAB.—Not unfrequent in deserted toungyas, etc., of Martaban and Tenasserim; also Chittagong—Fl. Fr. Febr.-March.—SS.=Metam.

N. B.—*V. vinifera*, L. (Brand. For. Fl. 98)—*Sa-pyit*—is often seen cultivated with Europeans, and is said to bear good grapes in Ava.

15. *V. Helferi*, Laws. in H.f. Ind. Fl. i. 662.—A large tendril-bearing climber, all younger parts webby-tomentose and partially glabrescent; leaves usually 5-foliolate with the two lateral leaflets pedately divided into two, on a 3-4 in. long woolly petiole; leaflets

lanceolate or oblong-lanceolate, on woolly petiolules  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, 5-6 in. long, coarsely serrate-toothed, more or less acute at the base, finely acuminate, when adult coriaceous, more or less tawny woolly along the nerves beneath; flowers small, sessile, and almost immersed, racemulose, forming a raceme-like, elongate, slender panicle either terminating one or both branches of the leaf-opposed little tomentose tendril of the length of the leaves or thereabouts; stigma sessile.

HAB.—Tenasserim.

### LEEa, L.

Calyx 5-toothed. Petals 5, united at the base and with the 5-lobed or 5-cleft staminal tube. Filaments inserted between the lobes of the tube and turned inwards. Ovary inserted on the disk, 3-6-celled, with a solitary ovule in each cell. Berry 3-6-celled. Seeds erect, with a hard testa.—Little trees or erect shrubs or undershrubs, with simple or variously pinnate or decompound leaves. Flowers small, in leaf-opposed corymbose cymes.

× Leaves ample, simple, or rarely 3-foliolate.

Leaves simple, large, very glaucous and shortly puberulous beneath; lobes of staminal tube entire.

*L. macrophylla*.

Leaves usually pinnately 3-foliolate, hardly glaucescent and minutely puberulous beneath; lobes of staminal tube notched

*L. latifolia*.

× × Leaves from simply pinnate to decompound.

○ All parts (except the inflorescences of a few species) glabrous.

† Inflorescence with persistent and conspicuous bracts and bractlets; flowers sessile or nearly so

*L. compactiflora*.

†† Bracts and bractlets minute, usually already dropped before the flower-buds are properly developed.

△ Leaves coriaceous. Flowers greenish-white.

Leaves dark-green; lobes of staminal tube erect, notched; seeds even and convex on back

*L. sambucina*.

Leaves dark-green; lobes of staminal tube reflexed, acuminate; seeds keeled and tubercled-ribbed

*L. gigantea*.

Leaves glaucous, the leaflets usually linear or lanceolate; lobes of the staminal tube erect, notched; seeds smooth and rounded on the back

*L. parallela*.

△△ Leaves more or less membranous. Flowers red or scarlet.

Leaflets 6-8 in. long; inflorescence rusty-tomentose

*L. laeta*.

Leaflets only 2½-4 in. long; inflorescence glabrous or nearly so

*L. coccinea*.

○ ○ More or less pubescent or stiff-hairy, at least the nerves beneath.

† Leaves usually simply pinnate.

Leaflets coarsely serrate, acute, roughish pubescent along the nerves beneath; nerves all parallel; petiolules thick and short; stems, petioles, peduncles, etc., all curled-winged; bracts and bractlets long, lanceolate-subulate

*L. crispa*.

Dwarf, all parts robust and densely pubescent or almost tomentose; petioles and petiolules terete; cymes tomentose; bracts minute

*L. pumila*.

+ + Leaves 2- or 3-pinnate.

- Leaflets coarsely serrate, acuminate, roughish pubescent on the parallel nerves beneath; stems and petioles terete or nearly so; peduncle compressed-cornered; bracts and bractlets small, linear-lanceolate; flowers greenish white . . . . . *L. aspera.*
- All parts stiff-pubescent; leaflets membranous, stiff-pubescent, beneath densely gland-dotted; petioles, etc., all terete; cymes stiff, pubescent; bracts large, broad-ovate, blunt . . . . . *L. aquata.*
- Almost glabrous or greenish-puberulous; leaves 2-3-pinnate; leaflets puberulous or glabrous, not gland-dotted beneath; bracts and bractlets none . . . . . *L. robusta.*
- Petioles, stems, etc., quite glabrous; leaflets small, sprinkled with white stiff hairs; bracts or bractlets none . . . . . *L. rubra.*

1. *L. compactiflora*, Kz.—An evergreen treelet (12—15 + 4—8 +  $\frac{1}{2}$ ), all parts glabrous; leaves twice pinnate, on a long terete petiole, glabrous; leaflets linear- to oblong-lanceolate, on sharply 4-cornered petiolules 2-3 lin. long, blunt at the base, 4-6 in. long, long acuminate, serrate, chartaceous; flowers small, greenish white, sessile, seated between the broad, short, scaly bracts, forming head-like clusters arranged in a short peduncled rusty-tomentose glabrescent corymbose cyme shorter than the petiole; petals about a line long, acute; lobes of staminal tube truncate (?)

HAB.—In the moister hill forests of the Martaban hills east of Tounghoo, at 3,000 to 4,000 ft. elevation.—Fl. Apr.-May.—s.—SS.—Metam.

2. *L. sambucina*, Willd.; Brand. For. Fl. 102.—*Kalet*.—An evergreen tree (15—20 + 6—10 +  $\frac{1}{2}$ —1), sometimes remaining shrubby, all parts glabrous; bark brown, thin, uneven, somewhat corky rough; cut brownish; leaves decompound-pinnate, those at the extreme branches more and more simply-pinnate, on a somewhat compressed glabrous petiole; leaflets oblong- or ovate-lanceolate and lanceolate, on rather slender petiolules, coarsely crenate-serrate, acuminate, thin coriaceous, quite glabrous and glossy, turning blackish in drying, the nerves beneath sharply prominent; flowers small, greenish white, on short and thick pedicels, forming an ample spreading 2-3-chotomous shorter or longer peduncled slightly tawny puberulous glabrescent cyme usually of the length of the petioles; floral bracts and bractlets dropped before flowering; calyx-lobes broadly 3-angular-ovate, acute or nearly so, glabrous; petals about a line long, hooded-acute; lobes of the staminal tube notched, not reflexed; berries depressed globular, the size of a pea, usually 6- or fewer-seeded; seeds smooth, convex on the back.

HAB.—Rather rare in the tropical forests of the eastern slopes of the Pegu Yomah, but frequent in those of Martaban down to Tenasserim, up to 2,000 ft. elevation.—Fl. March; Fr. May.—s.—SS.—Metam. SIS.

REMARKS.—Wood rather heavy, close-grained, soft, pale-brown, turning darker, with a silvery lustre, the pith medullary, brown, small; soon attacked by xylophages.

3. *L. gigantea*, Griff.—A shrub with a simple stem, or rather a treelet, all parts quite glabrous; leaves very large, supradecom-pound, on a slightly compressed smooth petiole; leaflets usually large, 6-8 in. long, on  $\frac{1}{2}$  an in. (the end-leaflets up to 2 in.) long petiolules, oblong to oblong-lanceolate, abruptly and shortly acuminate, acute at the base, coarsely crenate-serrate, thin coriaceous, quite glabrous, glossy, turning blackish in drying, the nerves beneath prominent; flowers rather small, greenish white, on very short thick pedicels or almost sessile, forming a large spreading 2-3-clotomously branched quite glabrous cyme in the axils of the leaves or at the end of the branches and of the length or longer than the petioles; bracts and bractlets very deciduous and fallen before the proper development of the bud; calyx-lobes short, rounded or almost acute, glabrous; petals reflexed, about a line long; lobes of the staminal tube triangular-lanceolate, acuminate, reflexed at the entire apex; berries depressed-globular, 4-6-seeded, the seeds bluntish-keeled and tubercled-ribbed along the sides.

HAB.—Tenasserim, apparently frequent.—Fl. Aug.-Oct.; Fr. Febr.-March.

4. *L. crispa*, L.; H.f. Ind. Fl. i. 665.—*Kalet-theing*.—A tall shrubby perennial, about 4 to 5 ft. high, the stems and petioles (especially while young) fringed with 6 to 8 narrow much-curled wings, almost glabrous; leaves pinnate or in luxuriant plants sometimes twice pinnate, on a glabrous, very short, stout, and leafy 4-5-winged petiole; leaflets usually in 2 pairs with an odd one, almost opposite, on very short and stout angular-winged petiolules, elliptically or ovate-oblong, about 5-6 in. long, acute, coarsely and sharply crenate-serrate, almost parallelly and plaitedly nerved, harshly chartaceous, glabrous above, beneath rough from short appressed hairs along the prominent excurrent nerves and veins; stipules large, falcate; cymes much shorter than the leaves, rather small, somewhat puberulous, branched already from the base or peduncled, the peduncles compressed, angular, and narrowly winged; bracts and bractlets linear-subulate, long; flowers small, greenish white, on short puberulous pedicels; calyx puberulous, 5-toothed, the teeth 3-angular; petals about a lin. long; lobes of the yellowish staminal tube notched; berries depressed-globular, the size of a large pea or larger, smooth, black, containing usually 6 seeds.

HAB.—Frequent in the savannah and lower mixed forests of Pegu and Martaban; also Chittagong.—Fl. May-June.—1.—SS.—All.

5. *L. aspera*, Wall.; H.f. Ind. Fl. i. 665; Brand. For. Fl. 102.—*Thakya-nway-than*.—A treelet (10—15+3—5+ $\frac{1}{2}$ —1), but usually shrubby, shedding leaves in H.S., the younger branchlets minutely puberulous; stems sometimes as thick as the arm, terete, longitudinally blackish and white-striped and rough from minute

corky warts, medullary within; leaves pinnate, the lowest pinnule on one or on both sides usually pinnately 3-foliolate, the upper leaves gradually turning 3-foliolate; the petiole and rachis slender, obsoletely angled, without wings, slightly puberulous, glabrescent; leaflets in 2 or often only in a single pair, on slender angular petiolules, oblong or ovate-oblong, rounded or obtuse at base, coarsely falcate-serrate, more or less long-acuminate, 6-7 in. long, chartaceous, glabrous above, beneath minutely gland-dotted all over, and the parallel prominent excurrent nerves all shortly pubescent; cymes much trichotomously branched, shorter than the leaves; the peduncle and ramifications compressed, angular, and usually on the one angle fringed with a narrow, straight, membranous wing; bracts and bractlets small, linear-lanceolate, acuminate; flowers small, greenish-white, on short puberulous pedicels; calyx glabrous or nearly so, almost truncately 5-toothed, the teeth broad and short; petals about a line long; lobes of the yellowish staminal tube narrow, notched; berries depressed-globular, the size of a large pea, smooth, bluish black, containing usually 6, rarely fewer, smooth seeds.

HAB.—Common in the mixed forests, especially the upper ones, as also in savannahs, all over Pegu, up to 2,000 ft. elevation.—Fl. May-June; Fr. C.S.—l. —SS.—All. S&S.

REMARKS.—Pith medullary, very large, the outer wood only 2-3 lin. thick, dark-brown, close-grained.

6. *L. æquata*, L. (*L. hirta*, Hornem.; H.f. Ind. Fl. i. 668). —*Naga-mouk*.—A shrubby perennial, with terete or slightly 6-8 angular stems, all parts more or less pubescent; leaves twice pinnate, the upper ones usually simply pinnate or occasionally simple, the petiole and rachis terete or nearly so, pubescent; leaflets on very short terete petiolules, oblong or elliptically oblong, 5 to 8 in. long, acuminate, serrate, membranous, on both sides (especially along the nerves) covered with short, white, stiff hairs, more or less glabrescent above, beneath copiously gland-dotted; cymes more or less stiff, usually sessile and branched already from the base or shortly peduncled, much trichotomously branched, tawny pubescent or almost hispid; bracts and bractlets large, broadly ovate, blunt; flowers small, white, very shortly pedicelled or almost sessile; calyx puberulous or almost glabrous, the teeth short and blunt; petals about a line long; lobes of the white staminal tube notched; berries depressed-globular, the size of a large pea, smooth, red, usually 6-seeded.

HAB.—Not unfrequent in the tropical and moister upper mixed forests of Arracan and Martaban, down to Tenasserim and the Andamans.—Fl. June-  
Octob.; Fr. C.S.—s.

## SAPINDACEÆ.

Flowers usually polygamous. Sepals 4 or 5, free or united, imbricate or rarely valvate. Petals 4 or 5, rarely one fewer, sometimes minute or wanting, frequently bearing a basal scale inside. Disk various, sometimes unilateral, rarely wanting. Stamens 8, rarely fewer or more, inserted round the ovary within the disk or sometimes unilateral; anthers erect or versatile. Ovary entire or lobed, 1-4 (usually 3-) celled, with 1 or 2 or rarely more ascending or rarely almost horizontal ovules in each cell; style simple or more or less divided. Fruit dry or succulent, dehiscent or indehiscent, entire or separating into lobes or cocci. Seeds with or without an arillus. Albumen none.—Trees or shrubs, rarely twiners, with alternate compound or decompound rarely simple leaves; flowers usually small and inconspicuous, variously arranged.

The majority of *Sapindaceæ* are readily recognised by having the disk outside, not inside the stamens, and by the 8 stamens in a 5-merous flower with a 3-merous ovary. Several produce delicious fruits, like the litchi, rambutan, longan, etc. Some possess poisonous principles, while others are used as astringents. The fruits of others are saponaceous and used instead of soap. *Acer saccharinum* in North America yields sugar. Nearly all the Burmese species are woody, and mostly trees, some of which yield valuable timber.

\* Fruit dry, dehiscent or indehiscent.

× Fruit a capsule, dehiscent loculicidally. Petals present.

○ Ovules solitary in each cell. Flowers regular.

Capsule coriaceous; cotyledons flat . . . . . *Cupania*.

Stamens 10, short; capsule woody . . . . . *Paranephelium*.

○○ Ovules 2 or more in each cell.

Flowers irregular; calyx bell-shaped or tubular; leaves digitate . . . *Aesculus*.

Flowers regular; capsules 2-valved; leaves pinnate . . . . . *Harpullia*.

×× Fruit an indehiscent samara or a capsule dehiscent septically. Petals none or present.

Fruit consisting of 2 indehiscent samaras . . . . . *Acer*.

Fruit a septical capsule; leaves simple . . . . . *Dodonæa*.

Fruit a septical capsule; leaves pinnate . . . . . *Zollingeria*.

\* \* Fruit indehiscent, drupaceous, sappy, fleshy, or rarely crustaceous.

× Fruit entire, 1-4 celled.

+ Without petals; calyx small, the lobes valvate or nearly so; seeds arillate . . . . . *Schleichera*.

+ + With petals. Sepals imbricate.

○ Albumen none. Stamens inserted within the disk.

Scale of the petals crested on the back; disk unilateral . . . *Hemigysora*.

Scale of the petals cucullate . . . . . *Lepisanthes*.

○ ○ Albumen present; stamens inserted  
outside to the base of the disk

*Turpinia.*

× × Fruit divided to the base into several lobes, the latter  
often solitary by abortion of the others.

+ Calyx 4- or 5-toothed or parted. Seeds arillate.

Calyx small, cup-shaped; petals none or various; stamens long-  
exserted

*Nephelium.*

Calyx cup-shaped, 4-5-cleft; petals 4-5, without a scale; stamens  
4-8, long-exserted

*Pometia.*

+ + Sepals free, broadly imbricate in 2 series. Arillus  
none.

○ Leaves pinnate.

× Flowers regular.

Carpels tubercled, dry . . . . . *Xerospermum.*

Carpels smooth and suppy . . . . . *Sapindus.*

× × Flowers irregular.

Fruit-lobes globose; testa of seeds bony . . . . . *Dittelasma.*

Fruit-lobes oblong; testa of seeds membranous . . . . . *Pancoria.*

○ ○ Leaves 1-3-foliolate . . . . . *Allophylus.*

## CUPANIA, L.

Flowers polygamously dioecious, regular. Sepals 4-5 (rarely 3 or 6), or united into a cup-shaped calyx, broadly imbricate. Petals as many as sepals or none, with or without a scale inside. Disk usually annular. Stamens often 8-10, inserted inside the disk; filaments short or long. Ovary 2-3 rarely 4-celled, with a solitary ovule in each cell. Capsule obversely ovoid or rarely globose, coriaceous or hard, 2-3 (rarely 4) -celled, often angular or lobed, opening loculicidally. Seeds more or less arillate. Cotyledons plano-convex.—Trees or rarely tall shrubs, with alternate pinnate leaves. Flowers small, in axillary or terminal panicles.

+ Capsules clavate-pyriform, more or less conspicuously  
3-lobed or angular, coriaceous.

\* Petals present, furnished with a double scale.

× Leaves and panicles glabrous.

Leaflets opaque, glaucescent beneath, the nerves thin; rachis nar-  
rowly winged upwards . . . . . *C. Griffithiana.*

Leaflets glossy, one-coloured, strongly nerved and net-veined;  
rachis terete . . . . . *C. glabrata.*

× × Leaflets beneath and panicle shortly tawny pubes-  
cent.

Leaflets chartaceous, fuscous in drying, opaque . . . . . *C. fuscidula.*

\* \* Petals none or minute, without scales.

Net-veination minute and obsolete; filaments glabrous; leaflets  
in 2 pairs . . . . . *C. Lessertiana.*

Net-veination strong and prominent on both sides; filaments ex-  
serted, pubescent; leaflets not fuscous . . . . . *C. Sumatrana.*

Net-veination thin, but prominent; filaments short, pubescent;  
leaflets fuscous . . . . . *C. Helferi.*

+ + Capsule to near the base divided into two divergent  
lobes, coriaceous.

Leaflets chartaceous, reddish fuscous beneath, glabrous; panicles  
tawny puberulous . . . . . *C. adenophylla.*

1. *C. Griffithiana*, Kz. (*C. pleuropteris*, H.f. Ind. Fl. i. 677, not Bl.).—An evergreen middling-sized tree, all parts glabrous; leaves glabrous, abruptly pinnate; the rachis semi-terete, marginate towards the end, but not winged; leaflets almost alternate, rarely opposite, in 2-3 pairs, oblong-lanceolate, usually obliquely so, decurrent on the very short petiolule, bluntish acuminate, 3-4 in. long, entire, coriaceous, beneath turning glaucous-brown in drying; flowers small, in short, slender, glabrous, axillary panicles; sepals almost orbicular, ciliate; petals spatulate-oblong, glabrous, with a woolly 2-cleft scale inside above the claw; stamens somewhat exserted; capsules about 8 lin. in diameter, shortly tapering at the base, glabrous, 3-lobed, the lobes divaricate, broadly rotundate.

HAB.—Tenasserim.

2. *C. glabrata*, Kz.; H.f. Ind. Fl. i. 676.—An evergreen tree, (20—30 + 8—10 + 2—3), all parts glabrous; leaves abruptly pinnate, on rather short petioles, quite glabrous and glossy; leaflets usually in 2 pairs, lanceolate to oblong-lanceolate, acuminate at both ends, 4-7 in. long, entire, firmly chartaceous, laxly but strongly net-veined, glossy; flowers small, white, on a line long pedicels, clustered, forming glabrous, simple or compound panicles in the axils of the leaves; sepals 5, obovate-rotundate, glabrous, villous-fringed, the 2 outer larger ones nearly a line long; petals 5, about  $\frac{1}{2}$  lin. long, linear-spatulate, glabrous outside, the whole inner side densely white-woolly; stamens 8; filaments villous to half-way up; ovary tawny-hirsute.

HAB.—Rather frequent in the tropical forests along the eastern slopes of the Pegu Yoma and Martaban.—Fl. Apr.-May.—s.—SS.—SiS. Motam.

3. *C. fuscidula*, Kz.; H.f. Ind. Fl. i. 677.—A small evergreen tree, all parts puberulous; leaves usually abruptly, rarely unpaired-pinnate, the rachis not winged, rusty pubescent; leaflets alternate, unequal and almost falcate, oblong-lanceolate, somewhat decurrent on the very short thick petiolule, about 4 in. long, apiculate, entire, chartaceous, turning blackish in drying, softly puberulous on both sides, especially beneath; flowers small, forming axillary rusty pubescent panicles shorter than the leaves; sepals oblong-rotundate, ciliate, and usually sprinkled with appressed stiff hairs; petals broadly oblong, bearing a 2-cleft woolly scale above the claw; stamens hardly exserted.

HAB.—Tenasserim.

4. *C. Lessertiana*, Camb.; H.f. Ind. Fl. i. 678.—An evergreen tree (30—40 + 10—15 + 3—4), all parts glabrous; leaves usually abruptly pinnate; together with the almost terete rachis quite

glabrous; leaflets in 2-3 (sometimes a single) pairs, opposite or nearly so, ovate-oblong to ovate-lanceolate, on rather long petiolules, acute, and a little decurrent at the base, bluntish acuminate, entire, coriaceous, elegantly net-veined, glossy above; flowers minute, apetalous, in simple or branched puberulous racemes often collected into larger terminal panicles; calyx puberulous; filaments quite glabrous, long and slender, the anthers comparatively large; capsules pear-shaped, sharply 3-cornered, much tapering at the base, while young sprinkled with minute hairs.

HAB.—Frequent in the tropical forests of South Andaman.—Fl. May-June.—s.—SS.=chloritic and serpentine rocks.

5. *C. Sumatrana*, Miq.; H.f. Ind. Fl. i. 678.—An evergreen tree, all parts glabrous; leaves pinnate, the terete rachis half-terete towards the end; leaflets in 2-4 pairs, shortly petioluled, oblong-lanceolate, 5-9 in. long, bluntish acuminate, entire, chartaceous, glabrous, shining above, strongly and elegantly net-veined on both sides; flowers apetalous, minute, forming large axillary and terminal minutely rusty-tomentose panicles; calyx pubescent, the teeth triangular-acute; capsules 3-sided-pear-shaped, much tapering at the base, glabrous.

HAB.—Rare in the tropical forests of the Pegu Yomah; also Tenasserim.—Fr. Apr.-May.—s.—SS.=SiS.—Metam.

6. *C. Helferi*, Hiern; H.f. Ind. Fl. i. 679.—Probably an evergreen tree; leaves abruptly pinnate, the rachis terete; leaflets in two pairs, elliptically oblong, on  $\frac{1}{4}$ - $\frac{1}{2}$  in long petiolules, almost acuminate, 5-8 in. long, obtuse at the base, glabrous, delicately net-veined; flowers 5-merous, on short spreading "racemes" (pedicels?) arranged in racemose pubescent almost terminal panicles longer than the leaves; calyx cleft, almost valvate,  $\frac{1}{2}$  in. in diameter, the lobes ovate; petals none; stamens 8, filaments pubescent; ovary pear-shaped, stalked, not lobed, pubescent.—(From Hooker's Fl. Ind.)

HAB.—Tenasserim.

6. *C. adenophylla*, Planch.; H.f. Ind. Fl. i. 677.—A small evergreen tree, 25-30 ft. high, the young branchlets minutely rusty-puberulous; leaves abruptly pinnate; the rachis slightly rusty-puberulous, soon glabrescent; leaflets in 2-3 pairs, opposite or nearly so, elliptically-lanceolate or lanceolate, on a short and rather thick petiolule, acuminate, with the point bluntish or notched, entire, almost coriaceous, glabrous, turning reddish-brown in drying, bearing glands in the nerve-axils beneath; flowers minute, yellowish, forming axillary short rusty-puberulous panicles; calyx 5-toothed, somewhat hairy outside, the teeth short and ciliate; petals minute, a little longer than the calyx, broadly cuneate, obliquely notched

or 2-cleft, pubescent on the inner face; filaments pilose, anthers puberulous; capsules coriaceous, glabrous, compressed 2-lobed, the lobes oblong, blunt, very compressed, bearing the persistent style in the sinus, one of the lobes usually much smaller or abortive.

HAB.—Tenasserim.

### PARANEPHELIUM, Miq.

Flowers polygamous. Calyx cup-shaped, 5-parted, valvate and slightly imbricate at the tips. Petals 5, sessile, furnished with a large broad basal scale inside. Disk crenulate, central, hairy. Stamens 6-10; filaments short. Ovary 3-celled, with a solitary ovule in each cell; style very short and thick; the stigma densely villous. Capsule woody, globose, acuminate-muricate or tubercled, 3-valved.—Trees, with pinnate leaves. Flowers small, in small axillary panicles.

1. *P. xestophyllum*, Miq.—A small evergreen tree, the young shoots slightly puberulous; leaves pinnate, glabrous, the rachis tawny puberulous, soon glabrescent; leaflets in 2-3 pairs, with or rarely without an odd one, on a rather short and thick slightly puberulous petiolule, oblong to oblong-lanceolate, apiculate, almost coriaceous, smooth and glossy on both sides; flowers minute, in rusty-tomentose short axillary panicles; calyx rusty-tomentose, the teeth 3-angular-acute; anthers glabrous; capsules almost globose, about an in. in diameter, woody-muricate, loculicidally 3-valved, the valves remaining coherent with their inner margins.

HAB.—Upper Tenasserim.

### ÆSCULUS, L.

Flowers irregular, polygamous. Calyx bell-shaped or tubular, 5-cleft, the lobes irregular and imbricate. Petals 4 or 5, unequal, clawed, without an appendage, imbricate. Stamens 5-8, inserted within the annular or one-side disk. Ovary 3-celled, with 2 ovules in each cell. Capsule coriaceous, smooth or echinate, loculicidally 3-valved. Seeds large, not arillate.—Trees, with opposite digitate leaves. Flowers rather large, in panicles or racemes.

1. *Æ. Assamica*, Griff. (*Æ. Pundwana*, Wall.; II.f. Ind. Fl. i. 675).—A large tree; leaves large, digitately 5-7-foliolate; leaflets oblong-lanceolate to cuneate-oblong, cuneate and somewhat decurrent at the base, acuminate, shortly petioluled, serrulate, glabrous, on both sides green; flowers rather conspicuous, white, pale rose-coloured at the base, racemose, forming an axillary velvety panicle; calyx tubular, velvety; stamens long, exserted; capsules obovoid, smooth, about 1½ in. long, apiculate, leathery, brown.

HAB.—Damp hill forests of Upper Tenasserim.

## HARPULLIA, Roxb.

Flowers regular, polygamous. Sepals 4 or 5. Petals as many, without any scale, but sometimes with basal inflexed auricles. Stamens 5-8, inserted within the conspicuous disk. Ovary 2-celled, with 2 ovules in each cell; style short or elongate and spirally twisted. Capsule coriaceous or chartaceous, somewhat compressed, 2- or rarely by abortion 1-lobed, the lobes inflated, loculicidally 2-valved. Seeds with or without arillus. Cotyledons thick.—Trees, with pinnate leaves. Flowers rather small or middling-sized, panicled.

1. *H. cupanioides*, Roxb.; H.f. Ind. Fl. i. 692 (*H. imbricata*, Bl.; Bedd. Sylv. Madr. t. 158).—A tree (80—90 + 50—60 + 6—14), evergreen or in drier tracts shedding leaves in the I.I.S., the younger parts tawny puberulous; leaves pinnate; the rachis slightly puberulous; leaflets 6-8 in. long, alternate, on short but slender petiolules, in 3 to 7 pairs, somewhat obliquely oblong or elliptically lanceolate, usually oblique at the acute base, bluntish acuminate, entire, membranous, puberulous on the principal nerves, soon glabrous; flowers comparatively large, in lax, slender, slightly puberulous panicles; sepals broadly oblong, blunt, tawny tomentose; petals white; disk puberulous; capsules broadly cordate, 2-lobed, the lobes inflated, reddish, glabrous, usually 2-seeded.

IIAB.—Frequent in the tropical forests of the Andamans; also Chittagong.—Fl. June.—s.—SS.—SiS.

## DODONÆA, L.

Flowers often dioecious or polygamous. Sepals 5, rarely fewer, valvate. Petals none. Disk small or obsolete. Stamens usually 8, sometimes fewer, rarely 10; filaments very short. Ovary 3-4 (rarely 5-6)-celled, with 2 ovules in each cell. Capsule membranous or coriaceous, opening loculicidally in as many valves as cells, usually winged. Seeds funicled. Embryo spirally curled.—Shrubs, with simple, entire, or rarely lobed leaves, the young shoots usually sticky. Flowers small.

1. *D. viscosa*, L.; H.f. Ind. Fl. i. 697; Bedd. Sylv. Madr. 75, t. 11, f. 2; Brand. For. Fl. 113.—A shrub, the cornered branches and younger shoots sticky; leaves varying from obovate-lanceolate to linear-lanceolate, tapering at the base, 2-4 in. long, blunt to acute, almost entire, with the margins often revolute, coriaceous, while young sticky; flowers small, greenish, on long slender pedicels, forming terminal and axillary short glabrous racemes; sepals ovate; stamens 5, rarely 8; style very short; capsules compressed, broadly 2-winged, rotundate-obcordate, about  $\frac{1}{2}$  in. across.

HAB.—Sandy shores of Tenasserim from Amherst to Mergui; also Narcondam island, Andamans.—Fr. March.—1.

### ZOLLINGERIA, Kz.

Flowers hermaphrodite. Sepals 5, imbricate, the 2 inner ones larger. Petals 5, almost clawed, with a basal woolly scale inside. Stamens 8, inserted round the ovary; filaments long, but not exserted. Ovary 3-sided-conical, 3-celled, with a solitary or 2 ovules in each cell. Capsules chartaceous, usually 3-winged, and (by maceration of the cell-walls) 1-celled, 1-2-seeded. Seeds without albumen. Cotyledons large, folded.—Trees, with pinnate leaves. Flowers small, in axillary or terminal panicles.

1. *Z. macrocarpa*, Kz.; H.f. Ind. Fl. i. 692.—*Wel-kyot-pen*.—A tree (50—80 + 25—50 + 3—6), leafless in the H.S., the young shoots tawny pubescent; bark about an in. thick, grey, roughish, breaking up into small tubular pieces; cut dry, pale-coloured; leaves usually unpairedly, rarely almost abruptly pinnate, glabrous; leaflets alternate, more or less unequal at the base, lanceolate to oblong-lanceolate, on a 2-3 lin. long petiolule, bluntish acuminate, 5-8 in. long, chartaceous, entire; flowers small, white, on 2 lin. long pedicels, forming short, somewhat nodding, glabrous or very slightly hairy panicles in the axils of the leaves or at the end of the branches; sepals about a lin. long, obovate, ciliolate, slightly notched; petals nearly 2 lin. long, glabrous except the villous base, ciliate, oblong, blunt, the woolly blunt scale adhering to the broad claw; filaments hairy; ovary slightly pubescent at the very base; capsules oblong, at the base surrounded by the disk, about 2 in. long, glabrous, 3- or rarely by abortion 2-winged; the wings broad, striate, rounded at the somewhat narrowed base, truncate at the broader end with the edges rounded.

HAB.—Not unfrequent in the mixed dry forests of the Prome district.—Fl. probably C.S. (?); Fr. March.—1.—SS.—CaS.

REMARKS.—Wood white.

### ACER, L.

Flowers regular, often polygamous. Calyx usually 5- (rarely 4-12) parted, deciduous, imbricate. Petals as many or sometimes entirely wanting. Stamens often 8, rarely 4-12, inserted outside or within the annular lobed disk. Ovary 2-lobed and 2-celled, with 2 ovules in each cell; styles 2, rarely 3. Fruit separating in 2-winged indehiscent samaras. Albumen none.—Trees, rarely shrubs, with opposite, simple, or palmately lobed leaves. Flowers small, in terminal or axillary racemes or corymbs.

× Leaves simple, not lobed, with 3 basal nerves.

Leaves usually whitish beneath, the petiole 1-2 in. long; cymes

glabrous; branchlets blackish

*A. laurinum.*

Leaves one-coloured, the petiole 3-6 lin. long; cymes panicle,

glabrous; branchlets pale brown

*A. laevigatum.*

× × Leaves 3-lobed and 3-nerved.

Glabrous; lobes of leaves long, acuminate, entire

*A. isolobum.*

1. *A. niveum*, Bl.; H.f. Ind. Fl. i. 693.—An evergreen (?) large tree, all parts glabrous; leaves ovate to ovate-oblong, rounded or obtuse at the base, on a long slender petiole, acuminate, entire, coriaceous, whitish beneath; flowers small, in racemose glabrous corymbs; stamens 6; samaras glabrous, the wings about an in. long and somewhat spreading.

HAB.—Frequent in the damp hill forests of the Martaban hills, east of Tounghoo, down to Tenasserim, at 4,600 to 6,000 ft. elevation.—s.—SS.—Metam.

2. *A. laevigatum*, Wall.—A tree, all parts glabrous; leaves ovate or oblong, rounded at the base, on a slender petiole  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, entire, glabrous, one-coloured, 3-nerved at the base and penninerved; flowers small, cymose, forming glabrous panicles appearing with the young foliage; carpels glabrous, 1-1 $\frac{1}{2}$  in. long, the wings veined, slightly diverging, dilated above, usually curved on the back.

HAB.—Hills of Upper Tenasserim.

3. *A. isolobum*, Kz.; H.f. Ind. Fl. i. 694.—An evergreen (?) tree (50—60 + 20—30 + 3—5), all parts glabrous; leaves palmately 3-lobed, 5-6 in. long and broad, rounded at the 3-nerved base, long petioled, glabrous, net-veined, the lobes spreading and acuminate; flowers and fruits unknown.

HAB.—Frequent in the damp hill forests of Martaban, at 5,000 to 7,000 ft. elevation.—s.—SS.—Metam.

## SCHLEICHERA, Willd.

Flowers regular, polygamously dioecious. Calyx inconspicuous, 4-6-cleft, valvate, or obscurely imbricate. Petals none. Disk complete, repand, glabrous. Stamens 6-8, very rarely 4-5, central; filaments elongate. Ovary 3-4-celled, with a solitary erect ovule in each cell. Fruit dry, almost crustaceous, stylose-acuminate, 1-3-celled. Seeds erect, enveloped in a pulpy arillus.—Trees, with alternate abruptly pinnate leaves. Flowers minute, racemose.

1. *Sch. trijuga*, Willd.; H.f. Ind. Fl. i. 681; Bedd. Fl. Sylv. Madr. t. 119; Brand. For. Fl. 105, t. 20.—A tree (50—70 + 20—30 + 8—12), leafless in the C.S., the shoots puberulous; bark grey, roughish, when old peeling off in small pieces; cut dry, reddish; leaves usually abruptly pinnate, while young puberulous, soon turning glabrous; leaflets in 2-3 rarely 4 pairs, sometimes with an odd

one, opposite or nearly so, very shortly petioluled or almost sessile, broadly lanceolate or oblong, about 4-8 in. long, bluntish acuminate or apiculate, rarely blunt or notched, entire, chartaceous, elegantly net-veined; flowers minute, apetalous, yellowish green, on rather short pedicels, forming usually axillary solitary racemes shorter than the leaves; drupes dry, the size of a cherry, ovoid or ovoid-oblong, uncinuate, smooth, 1-2- rarely 3-seeded.

HAB.—Common in all leaf-shedding forests, especially the mixed ones, from Ava and Martaban down to Tenasserim.—Fl. March-Apr.—l.—SS.=  $\infty$  SiS.

REMARKS.—Wood brown, very heavy, close-grained and durable, takes fine polish.  $\square'$ =70 pd. Used for cart-wheels, the teeth of harrows, the pestles of oil-mills, etc. Exudes a yellowish resin. Lac is produced on the tree.

### HEMIGYROSA, Bl.

Flowers polygamously monoecious, irregular. Sepals 5, the 2 outer ones smaller, broadly imbricate. Petals 5, unequal, furnished with a crested basal scale inside, the 5th not scaled or often wanting. Disk cushion-like, one-sided. Stamens 8, unequal, one-sided, hardly exerted. Ovary excentric, 3-celled. Fruit fleshy or coriaceous, 3-lobed, indehiscent. Seeds not arillate. Cotyledons equal, fleshy.—Trees, with pinnate leaves. Flowers comparatively large, in axillary branched racemes or panicles.

1. *H. canescens*, Thw.; H.f. Ind. Fl. i. 671; Bedd. Sylv. Madr. t. 151.—An evergreen middling-sized tree, the younger parts shortly greyish tomentose; bark ash-coloured, somewhat rough; leaves abruptly pinnate; the rachis slightly puberulous, but soon glabrescent; leaflets in 2 pairs, obovate or oblong, on a short, thick, puberulous petiolule, more or less blunt or bluntish apiculate, entire, chartaceous, glabrous, net-veined; flowers rather large, white, racemose, forming usually greyish-tomentose panicles; sepals rotundate, silvery canescent; petals 4, flat, obovate-oblong, the claws silky on the back, the basal woolly scale 2-cleft, waved or crisped, bearing a cuneate-crested appendage on the back below the cleft; disk crenulate, one-sided; stamens 8, unilateral; fruit fleshy, 3-gonous-ovoid, the size of a bullet, densely greyish velvety.

HAB.—Tenasserim.

### LEPISANTHES, Bl.

Flowers regular, polygamously dioecious. Sepals 4-5, imbricate. Petals 4-5, furnished with a cucullate scale on the inner side above the claw. Disk annular, regular. Stamens 8, rarely 9-11, central. Ovary 3-4-celled, with a solitary ovule in each cell. Fruit indehiscent, 3-4-angular, coriaceous or fleshy, 3-4-celled. Seeds without arillus.—Trees with pinnate leaves. Flowers rather small, in axillary and terminal panicles.

Leaves slightly puberulous on the midrib beneath; pedicels  $1\frac{1}{2}$ -2

lin. long, filiform; scale of petals densely white-villous fringed *L. Burmanica*.

Leaves quite glabrous; pedicels very stout, about  $\frac{1}{2}$  lin. long;

petals inside and scale glabrous . . . . . *L. montana*.

1. *L. Burmanica*, Kz. (*L. montana*, Hiern.; H.f. Ind. Fl. i. 679, and Kurz Prel. Rep., Pegu, A.-38, not Bl.).—An evergreen tree (20—25+15—20+1—2), the trunk simple and palm-like, not or almost not branched, the shoots puberulous; bark a line thick, smooth, minutely and longitudinally fissured, greyish-brown; cut dry, pale-coloured; leaves 2-3 ft. long, abruptly pinnate, the rachis half-terete, slightly channelled; leaflets almost opposite, elliptically or oblong-lanceolate, obtuse at the base, very shortly petioluled, acute, chartaceous, entire, glabrous or slightly puberulous on the midrib beneath; flowers in large terminal and axillary tawny puberulous racemes forming a large terminal panicle; fruits on a short and thick peduncle, obtusely 3-4-lobed, the size of a bullet, fleshy, densely tawny tomentose, the cell-walls inside mottled, but smooth.

HAB.—Not uncommon in the tropical forests of the eastern and southern slopes of the Pegu Yomah and in Martaban, up to 2,000 ft. elevation.—Fr. Febr.-March.—s.—SS.—SiS. *Metam.*, Lat. p.

REMARKS.—Wood white, rather heavy, fibrous but close-grained, soon attacked by xylophages.

2. *L. montana*, Bl. (*L. Browniana*, Hiern.; H.f. Ind. Fl. ii. 680).—A small evergreen tree, all parts glabrous; leaves  $1\frac{1}{2}$ -2 $\frac{1}{2}$  ft. long, on a rather slender petiole  $\frac{1}{2}$ -1 ft. long; leaflets in 7-11 pairs, alternate or sometimes opposite, elliptically oblong to oblong and linear-oblong, cuneate at the base, on glabrous petiolules up to  $\frac{1}{2}$  in. long, acuminate, 4-9 in. long, chartaceous, glabrous; flowers rather largish, white, on very stout pedicels about  $\frac{1}{2}$  a line long, forming short and dense puberulous racemes arising usually in clusters or almost singly from the axils of the leaves; petals inside and scale glabrous; fruits trigonously ovoid, the size of a wood-apple, puberulous, stylose-acuminate.

HAB.—Tenasserim.

## TURPINIA, Vent.

Flowers regular, hermaphrodite. Calyx 5-cleft, imbricate, persistent. Petals 5, imbricate. Stamens 5, inserted outside to the base of the crenate or lobed disk. Ovary 3-lobed and 3-celled, with several (usually 6-8) anatropous ascending ovules in each cell; styles 3, rarely free. Fruits almost globose, fleshy or coriaceous, indehiscent, 3-celled. Seeds albuminous.—Trees or shrubs, with pinnate or rarely 1-foliolate leaves, the leaflets serrulate. Flowers small, in panicles.

Leaves apiculate; flowers about 3 lin. in diameter : : *T. pomifera*.  
 Leaves almost caudate; flowers hardly 2 lin. in diameter : : *T. Nepalensis*.

1. *T. pomifera*, DC. ; H.f. Ind. Fl. i. 698.—*Touk-sha-ma*.—An evergreen tree (30—40+12—20+2—3), all parts glabrous; bark rather smooth, about 2 lin. thick, grey, minutely corky lenticellate; cut dryish, pale-coloured; leaves pinnate, glabrous and glossy; leaflets 5-7 in. long, in 2-3 pairs with a long-petioluled odd one, oblong to elliptically oblong, shortly petioluled, acute at the base, apiculate, serrate, coriaceous; flowers small, greenish white, shortly pedicelled, forming trichotomous glabrous panicles in the axils of the upper leaves and shorter than them; sepals and petals rotundate, ciliolate, about 1½ lin. long; fruits globose, especially while young often stylose-3-pointed, fleshy, green, smooth, the size of a large cherry.

HAB.—Frequent in the tropical forests of Pegu and still more so in those of Martaban; also Chittagong.—Fl. Febr.—Fr. C.S.—s.—SS.—*Metam.* SiS.

REMARKS.—Wood very pale brown or greyish, rather heavy, fibrous, but close-grained, tolerably soft, soon attacked by xylophages.

2. *T. Nepalensis*, Wall. ; Bedd. Sylv. Madr. t. 159.—*Donk-ya-ma*.—An evergreen tree (20—30+8—15+2—3), all parts quite glabrous; leaves pinnate, quite glabrous and glossy above; leaflets only 3-4 in. long, in 2 or a single pair with a long-petioluled odd one, oblong-lanceolate to lanceolate, acute at the base, acuminate or almost caudate, serrate-toothed, coriaceous; flowers minute, greenish, forming large trichotomous panicles in the axils of the upper leaves and as long or sometimes longer than them; petals and sepals oblong, blunt, ciliolate, hardly a line long; fruits small, scarcely fleshy, usually 3-seeded, stylose-3-pointed.

HAB.—Frequent in the hill forests, especially the drier ones and the pine forests of Martaban, at 3,000 to 7,200 ft. elevation.—Fl. March.—s.—SS.—*Metam.*

### NEPHELIUM, L.

Flowers regular, polygamous. Calyx small, cup-shaped, 4-5-rarely 6-toothed or-lobed, valvate or slightly imbricate. Petals none or as many as calyx-lobes, small, furnished with a 2-cleft scale or with 2 distinct scales at the base inside. Stamens 6-10, inserted within the annular disk. Ovary 2-3-lobed and -celled, with a solitary ovule in each cell. Fruit usually deeply 2-3-lobed or by abortion reduced to a single lobe, the lobes indehiscent or hardly 2-valved or rupturing. Seeds more or less completely enveloped by the arillus. Cotyledons thick.—Trees, with pinnate leaves. Flowers small, in axillary or terminal panicles.

\* *Petals none. Calyx-toothed.*

○ Fruit covered with fleshy, soft, subulate or angular conical prickles.

Glabrous; leaflets glaucous or whitish beneath; prickles of fruit fleshy, long, conically angular, truncate, glabrous. . . . *N. Griffithianum*.

Leaflets more coriaceous, pale beneath or almost one-coloured;  
prickles of fruit subulate, variously curved and incurved,  $\frac{1}{2}$ - $\frac{3}{4}$   
in. long, glabrous . . . . . *N. lappaceum*.

○ ○ Fruits tubercled.

Leaflets very coriaceous, small, the net-veination quite obsolete, the  
nerves thin and faint; fruit-lobes ollipsoid-oblong, the size of  
a prune, covered with sharp compressed-tessellate tubercles . . . *N. Litchi*.

\* \* Petals present. Calyx cleft to  $\frac{1}{2}$  or to near the base.

Leaflets firmly coriaceous, glaucescent beneath, in drying fuscaceous,  
the lateral nerves thin and slightly prominent; fruit-lobes oblong,  
shortly muricate, the murices about a line long,  
sharp . . . . . *N. rubescens*.

Leaflets thin coriaceous, more or less glaucescent beneath; fruit-lobes  
ovoid-oblong, the size of a plum, perfectly glabrous,  
strongly tubercled as in *N. Litchi*, but not tessellate . . . *N. hypoleucum*.

As former, but leaflets usually smaller; fruit-lobes globose, the  
size of a cherry, obsoletely tubercled, minutely tawny velvety  
all over . . . . . *N. Longanum*.

Fruits with subulate, long, soft prickles . . . . . *N. lappaceum*.

1. *N. hypoleucum*, Kz.—*Kyet-mouk*—An evergreen tree (30—50+15—25+3—5), the young shoots rusty puberulous; leaves abruptly or more usually unequally pinnate, the rachis almost terete and slightly rusty puberulous while young; leaflets 6-10 in. long, oblong or ovate-lanceolate, usually somewhat oblique, acute at the base, acuminate, nearly coriaceous, glabrous, beneath glaucous and delicately net-veined; flowers minute, pedicelled, forming axillary and terminal tawny puberulous panicles; calyx puberulous, the teeth sometimes ciliate; petals linear-spathulate; filaments long, pilose especially towards the base; fruit-lobes usually solitary by abortion, the shape and size of a plum, yellowish crimson, covered with a muricate-areolate almost crustaceous epicarp, 1-seeded, the seed large, entirely enveloped in the sappy, white, acid-sweet arillus.

HAB.—Rare in the tropical forests of the eastern slopes of the Pegu Yomah, but frequent in those of Martaban, up to 2,000 ft. elevation; also cultivated.—Fl. Jan.; Fr. Apr.—s.—SS.—SiS. *Metam.*, Lat. p.

2. *N. Litchi*, W. A.; H.f. Ind. Fl. i. 687.—*Kyet-mouk*.—An evergreen tree (30—40+12—20+3—4), all parts glabrous; leaves usually abruptly pinnate; leaflets in 6 to 2 pairs, opposite, lanceolate, shortly petioluled, about 3-6 in. long, acuminate, entire, coriaceous, glossy above, glaucous beneath, the net-veination obsolete; flowers minute, greenish, shortly pedicelled, forming a terminal branched usually slightly puberulous panicle of the length of the leaves or longer; petals none; stamens 6-8; filaments and ovary pubescent; style with 2 stigmatic lobes; fruit-lobes usually solitary by abortion, rarely paired, oval, the size of a pigeon's egg, covered by the red muricate-areolate somewhat crustaceous epicarp, 1-seeded; the seed large, completely covered with the sappy, whitish, edible, sweet arillus.

HAB.—Chittagong, cultivated only.—Fl. Febr.-March.

REMARKS.—Wood red-brown, rather heavy, close-grained, takes fine polish.

N. B.—*N. rubescens*, Hiern., is said to occur in Tenasserim.

3. *N. Griffithianum*, Kz.—An evergreen tree, the leaf-buds tawny velvety; leaves glabrous, unpaired-pinnate, on a 2-3 in. long glabrous somewhat glaucous petiole; leaflets in 3-4 pairs with an odd one, ovate-oblong to oblong, shortly petioluled, obtuse or nearly so at the unequal base, shortly acuminate, chartaceous, glaucous beneath, the net-veination conspicuous and prominent on both sides; flowers unknown; fruits (according to Griff. racemose) by abortion 1-lobed, the lobe almost sessile, oblong, the size of a small egg, covered by soft angular-compressed conical nearly  $\frac{1}{2}$  in. long prickles, 1-seeded, the seed large, enclosed in a white sappy acid arillus.

HAB.—Ava, hills east of Bhamo.—Fr. May.

4. *N. Longana*, Camb.; H.f. Ind. Fl. i. 689 (*Euphoria Longana*, Lamk.; Bedd. Sylv. Madr. t. 156).—*Kyet-monk*.—An evergreen tree, (30—50+15—25+4—5), all parts glabrous; leaves abruptly pinnate; leaflets in 3-4 pairs, almost opposite, on a short thick petiolule, lanceolate, about 3-4 in. long, rather blunt, entire, coriaceous, glossy above, glaucous beneath; flowers small, yellowish white, very shortly pedicelled, forming a terminal slightly rusty-puberulous glabrescent panicle of the length of the leaves or longer; petals 5, lanceolate, hairy; stamens 6-8; filaments tomentose; style with 2 or 3 stigmatic lobes; fruit-lobes usually solitary, rarely 2-3, almost globose, the size of a cherry, covered with a brownish gray, roughish areolate, somewhat crustaceous epicarp, 1-seeded, the seed large, entirely enclosed by the sappy, whitish, sweet, edible arillus.

HAB.—Rare in the tropical forests of the eastern slopes of the Pegu Yomah (Khaboung); also cultivated.—Fl. March.—s.—SS.—SiS.

REMARKS.—Wood brown, rather heavy, finely close-grained and apparently durable. Good for furniture and takes fine polish.

## POMETIA, Forst.

Flowers regular, polygamous. Calyx cup-shaped, 4-5-cleft, valvate. Petals 4-5, without a scale. Stamens 4-8, inserted within the disk, the filaments elongate and exserted. Ovary deeply 2-3-lobed and -celled, with a solitary ovule in each cell; style twisted. Fruit-lobes 1-2, dry or drupaceous, indehiscent. Seeds enclosed in a mucous arillus.—Trees, with pinnate leaves, the lowermost leaflets much smaller and almost stipule-like. Flowers small, in racemes or panicles.

1. *P. tomentosa*, Bth. & H.f.; Hf. Ind. Fl. i. 691.—An ever-green tree (80—90+40—45+6—10), the shoots and younger parts rusty pubescent; leaves abruptly or unpaired-pinnate, 1-3 ft. long, while young puberulous beneath, soon quite glabrous, the rachis rusty-pubescent, glabrescent; leaflets in 4-9 pairs, alternate or rarely the upper ones almost opposite, ovate-oblong to oblong-lanceolate, 6-7 (in young trees 15-18) in. long, on short and thick rusty-pubescent petioles, usually narrowed towards the rounded base, remotely and irregularly serrate, acuminate, membranous, while young the midrib and the under-surface puberulous, soon glabrescent, the lowest pair of leaflets almost orbicular and stipule-like reduced; flowers minute, racemose, in terminal and axillary rusty puberulous panicles; fruits 1- or 2-lobed, the lobes elliptically oblong, smooth, the size of a plum.

HAB.—Very common in the tropical forests of the Andamans.—Fr. May-June.—s.—SS.—SiS. *Metam.*

REMARKS.—Wood whitish, very light, and very coarsely fibrous.

### XEROSPERMUM, Bl.

Flowers regular, polygamously-dioecious. Sepals 4, imbricate, the outer ones smaller. Petals 4, without a scale. Disk annular, fleshy. Stamens 8; the filaments filiform. Ovary didymous, 2-celled, with a solitary ovule in each cell. Fruit 1- or 2-lobed, the lobes diverging and tubercled. Seeds without arillus, the testa pilose, fleshy outside and arillus-like.—Trees, with pinnate or pinnately 3-foliolate leaves. Flowers small, in almost simple axillary or terminal racemes.

1. *X. Noronhianum*, Bl.; H.f. Ind. Fl. i. 686.—A small ever-green tree, the young shoots puberulous; leaves abruptly pinnate or often pinnately 3- or 2-foliolate; leaflets oblong or elliptically oblong, almost opposite, 6-7 in. long, acute at the base, on a short and strong petiolule, acuminate, entire, coriaceous, glabrous, glossy, strongly-netveined; flowers small, greenish, forming short, almost simple glabrous racemes arising singly or by 2-3 from the axils of the leaves or sometimes crowded towards the end of the branches; fruit-lobes 1 or 2, the shape and size of a plum, coriaceous, densely muricate.

HAB.—Tenasserim.

### PANCOVIA, Willd.

(*Erioglossum*, Bl.)

Flowers more or less irregular, polygamous. Sepals 5, broadly imbricate. Petals 4, shortly clawed, with a hooded scale inside.

Disk one-sided, lobed. Stamens 8; filaments short. Ovary 3-lobed, 3-celled, with a solitary ovule in each cell. Fruit fleshy or coriaceous, divided into 1-3 indehiscent lobes or rarely 1-lobed by abortion. Seeds oblong, without arillus. Cotyledons thick.—Trees, with pinnate leaves. Flowers comparatively rather large, in terminal and axillary panicles.

Sepals rotundate, blunt, petals elliptical, rounded, the scale hooded. *P. rubiginosa*.  
Sepals oblong-lanceolate; petals elongate-cuneate, the scale 2-cleft. *P. tomentosa*.

1. *P. rubiginosa*, Baill. (*E. rubiginosum*, Brand. For. Fl. 108; *E. edule*, Bl.; H.f. Ind. Fl. 672; Bedd. Fl. Sylv. Madr. 73).—*Ts'ik-chay*.—An evergreen tree (25—30 + 8—15 + 2—3½), all softer parts more or less softly tawny pubescent; bark 2-3 lin. thick, lenticellate-rough, greyish, peeling off in irregular brittle flakes; cut reddish; leaves abruptly pinnate; leaflets in 6-4 pairs, almost opposite, oblong-lanceolate, about 4-5 in. long, shortly petioluled, more or less acuminate, entire, glabrous above, pubescent beneath; flowers rather small, white, shortly pedicelled, racemose, forming an ample rusty or tawny tomentose terminal panicle; sepals coriaceous, pubescent; petals somewhat longer, furnished with a woolly scale; style simple, slender; berries often by threes or fewer by abortion, oblong, the size of a small bean, smooth, purplish black, 1-seeded.

HAB.—Frequent in the tropical, rare in the moister mixed forests, from Pegu and Martaban down to Tenasserim and the Andamans.—Fl. March-Apr.; Fr. May-June.—8 x 1.—SS.=∞.

REMARKS.—Wood white or pale-coloured with pinkish brown heart-wood, strong and durable. Adapted for house-building.

2. *P. tomentosa* (*Sapindus tomentosus*, Kz.).—Probably a tree, all softer parts pubescent; leaves pubescent or shortly tomentose, abruptly pinnate; leaflets in 4 to 3 pairs, obliquely ovate-oblong, shortly petioluled, 4-5 in. long, acute at the unequal base, acuminate or acute, entire, chartaceous, glabrous except on the nerves above, shortly and densely tomentose beneath; panicle shortly tomentose, terminal; sepals oblong-lanceolate, acute, pubescent outside; petals elongate-cuneate, shortly villous towards the base, the blade obovate, bearing at the middle a 2-cleft scale densely woolly inside; filaments long-pilose; style simple, continuous; unripe drupes peduncled, 2- or by abortion usually 1-lobed, stylose-acuminate, 1-seeded; seed erect; radicle linear, straight.

HAB.—Ava, Khakhyen hills.

### DITTELASMA, Hf.

Flowers irregular, polygamously monoecious. Sepals 5, broadly imbricate. Petals 4, with a large scale inside. Disk half-crescent-annular, glabrous. Stamens 8; filaments shaggy. Ovary glab-

rons, 3-celled and 3-lobed, with a solitary ovule in each cell. Drupe 1-3-coccons, fleshy. Seeds globose, the testa bony.—Trees, with pinnate leaves and panicle flowers.

1. *D. Rarak*, H.f. Ind. Fl. i. 672.—An evergreen tree (50—60 + 25—30 + 4—5), all parts glabrous; leaves  $1\frac{1}{2}$ –2 ft. long, abruptly or unpaired-pinnate, the petiole semiterete and smooth; leaflets in 7–10 and more pairs, almost opposite or alternating, on hardly a line long petioles, almost falcate, oblong-lanceolate, acute at the base, 3–5 in. long, acuminate, entire, membranous, lively green and glabrous; flowers rather small, irregular, greenish white, polygamously-dioecious, shortly pedicelled, forming an ample terminal tawny velvety panicle; calyx appressed tawny pubescent; the sepals very unequal, the 2 upper ones largest and collateral, opposite to the fifth wanting petal; petals 4, oblong-lanceolate, about a line long, appressed pubescent outside, ciliate, the scale almost as long as the petal and very villous; stamens 8; the filaments hairy, glabrous towards the apex, somewhat exerted; ovary glabrous; fruits by abortion usually 1- or 2-lobed, orange-coloured, smooth, fleshy, the lobes oblong or elliptically oblong, 1-seeded; seed large, almost globose.

HAB.—Rather rare in the tropical forests of the Pegu Yomah (in the Gyo Gyo valley, Kambala Toung); Tenasserim.—s.—SS.—SiS.

### SAPINDUS, Plum.

Flowers regular, polygamous. Sepals 4–5, broadly imbricate. Petals 4–5, with or without scales. Disk complete, annular. Stamens usually 8–10, inserted within the disk. Ovary 2–4-lobed and 2–4-celled, with a solitary ovule in each cell; style terminal; stigma 2–4-lobed. Fruit 1–2–3-coccons, fleshy or coriaceous, the cocci indehiscent. Testa of seeds membranous or crustaceous. Cotyledons thick.—Trees or shrubs, with pinnate or simple leaves. Flowers in terminal and axillary panicles.

#### \* *Leaves 2-foliolate.*

Panicles slender, pubescent; fruit-lobes  $1\frac{1}{2}$ –2 lin. long . . . . *S. microcarpus*.

#### \* \* *Leaves pinnate or simple, or rarely simple and semi-pinnate on the same plant.*

Leaves pinnate, long-petioled, remote; flowers pink . . . . *S. ruber*.

Leaves simple, almost sessile, crowded; flowers white . . . . *S. Danura*.

1. *S. microcarpus*, Kz.—Probably a tree, the shoots sparingly hirsute; leaves 2-foliolate, on a sparingly hirsute petiole only 1–2 lin. long; leaflets oblong to linear-oblong, acuminate at the oblique base, 2–3½ in. long, rather blunt or almost retuse, entire, coriaceous, glabrous, prominently net-veined on both surfaces; flowers small, glabrous, on ½ lin. long pedicels, forming slender pubescent and soon glabrescent panicles in the axils of the leaves and at the end

of the branchlets; berries usually deeply 2- or by abortion 1-lobed, the lobes obovate, diverging,  $1\frac{1}{2}$ -2 lin. long, glabrous.

HAB.—Adjoining Siamese province of Kanboorec.—Fr. Apr.-May.

2. *S. ruber* (*Scytalia rubra*, Roxb.; *S. attenuatus*, Wall.; II.f. Ind. Fl. i. 684).—A large evergreen shrub or small tree, all parts quite glabrous; leaves abruptly or almost abruptly pinnate, glabrous, the rachis and petiole terete; leaflets in 4-5 or fewer pairs lanceolate to ovate-lanceolate, somewhat unequal at the acute or acuminate base, shortly petioluled, 3-4 in. long, long but bluntnish acuminate, chartaceous, glabrous; flowers small, purple, on slender pedicels, forming ample lax axillary or supra-axillary glabrous panicles; sepals  $\frac{1}{2}$  lin. long, lanceolate, acuminate; petals concave-rotundate, 2 lin. long, rounded the scale present or obsolete; stamens not exerted, the filaments almost wanting; ovary 2-lobed; fruit 2-lobed, the lobes ellipsoid, the size of an olive, glabrous, dark purple; seeds covered with an edible arillus.

HAB.—Forests of the Chittagong hills.

3. *S. Danura*, Voigt.; II.f. Ind. Fl. i. 684.—A little evergreen tree or usually remaining shrubby, all parts glabrous; leaves often crowded so as to appear verticillate, simple, on very short and thick petioles or almost sessile, broadly or oblong-lanceolate, about 6-12 in. long, tapering towards the cordate or often almost acute base, entire, acuminate, chartaceous, glabrous, glossy above; flowers small, whitish or pinkish white, pedicelled, forming a glabrous terminal panicle about half as long as the leaves; petals cuneate-oblong, blunt, furnished with a single, short, woolly scale; disk conspicuous, crenulate; stamens 6-8; filaments glabrous; ovary 2-lobed-obcordate, with 2 short stigmatic lobes; berries rarely didymous, but usually solitary by abortion, oblong, the size of a bean, smooth, red, 1-seeded.

HAB.—Frequent in the tidal forests of the Andamans, also in those of Pegu and Tenasserim.—SS.=Sal.

## ALLOPHYLUS, L.

Flowers polygamous. Sepals 4, broadly imbricate, the 2 outer ones smaller. Petals 4, rarely none. Disk one-sided, usually lobed or divided into 4 glands. Stamens 8, more or less one-sided. Ovary excentric, 2- or rarely 3-celled, with a solitary ovule in each cell. Fruit consisting usually of one, rarely 2, indehiscent fleshy or dry lobes. Seeds with a small arillus. Cotyledons folded.—Shrubs or trees, with 1-3-foliate leaves. Flowers very small, in simple or panicle axillary racemes.

\* Rachis of inflorescence perfectly glabrous or nearly so;  
racemes simple . . . . . *A. Cobbe*.

\*\* Rachis of inflorescence more or less pubescent or villous. Bractlets minute and short; the whole plant pubescent or villous-pubescent . . . . . *A. serratus*.

Bractlets linear, as long or longer than the pedicels; the whole plant rather glabrous, only the nerves above villous . . . . . *A. aporeticus*.

1. *A. Cobbe*, Bl.—(*A. littoralis*, Bl.).—A shrub, all parts glabrous; leaves small, 3-foliolate; leaflets on short petiolules or almost sessile, ovate or ovate-oblong, about 2-3 in. long, rarely longer, cuneate and decurrent at the base, blunt or bluntish acuminate, crenate-toothed, membranous or nearly so, glabrous, except a hair-tuft in the nerve-axils beneath; flowers small, whitish, shortly pedicelled, in small clusters, forming slender, simple, axillary, perfectly glabrous racemes shorter or longer than the leaves; petals cuneate, notched, with a basal scale bearing a tuft of hair above the claw or woolly all over; filaments villous at the base; ovary pubescent, 2-lobed; berries usually solitary, very rarely paired, globular, the size of a pepper-kernel, bright red, 1-seeded.

HAB.—Pegu and Tenasserim; also Chittagong.—Fl. July.

2. *A. serratus*, DC.—A much-branched evergreen little tree, the shoots slightly pubescent, soon glabrescent; leaves 3-foliolate; leaflets ovate to ovate-oblong, shortly petioluled or almost sessile, about 2-4 in. long, acute or acuminate, irregularly and coarsely serrate, sometimes almost entire, while young (especially beneath) pubescent, or glabrous from the beginning and bearing only a hair-tuft in the nerve-axils beneath; flowers small, whitish, shortly pedicelled, in small clusters, forming simple or slightly branched pubescent or puberulous slender axillary racemes of the length of the petioles or longer; petals cuneate, notched, with a basal scale bearing a tuft of wool or villous all over; filaments woolly at the base; ovary pubescent, 2-lobed; berries usually paired, rarely solitary, obovoid or almost globular, the size of a pepper-kernel, smooth, bright red, 1-seeded.

HAB.—Coasts from Chittagong and Arracan down to Tenasserim.

3. *A. aporeticus*, Kz.—A small meagre shrub, usually 2-3 ft. high, the younger parts shortly pubescent; leaves rather large, 3-foliolate, on a slightly pubescent petiole 3-5 in. long; leaflets cuneate-oblong or cuneate-obovate, the lateral ones somewhat unequal, on short thick sparingly pubescent petiolules, shortly acuminate, 6-8 in. long, remotely and irregularly serrate, membranous, glabrous, the nerves more or less pubescent beneath and densely tawny villous above; flowers clustered, small, pale-yellow, on short, slender, glabrous pedicels, supported by linear-subulate hirsute bracts of the length of, or usually longer than, the pedicels themselves; racemes rather robust, recurved, simple, axillary, tawny villous and shorter than the petioles; petals obovate-cuneate, notched, very

woolly inside above the middle; filaments glabrous or woolly at the base; ovary villous; berries usually solitary by abortion, very rarely paired, the size and shape of a large pea, crimson, glossy, 1-seeded.

HAB.—Very frequent in the moister upper mixed forests of Arracan up to 1,200 ft. elevation.—Fl. Fr. Octob.—s.—SS.—SIS.

### SABIACEÆ.

Flowers hermaphrodite or polygamously dioecious. Calyx 4-5-parted, imbricate. Petals 4-5, equal or unequal, alternating with, or opposite to, the sepals, imbricate. Stamens 4-5, opposite the petals, inserted at the base of the small disk or on the torus, free or cohering with the petals, usually 2 only perfect, the others reduced to scales, rarely all fertile; anthers didymous, the cells opening by a transverse slit or deciduous hood. Ovary 2-3-celled, with 1 or 2 horizontal or suspended ovules in each cell; styles cohering or the stigmas sessile. Ripe carpels 1-2, drupaceous or dry, indehiscent, compressed-kidney-shaped or almost globular, the endocarp crustaceous or bony, 1-seeded. Albumen none or scanty. Cotyledons much folded; radicle inferior.—Shrubs or trees, rarely climbers, with alternate, simple or pinnate leaves. Stipules none. Flowers usually minute; inflorescence various, usually a panicle.

Stamens 4-5, all perfect; drupes compressed-kidney-shaped; often climbers . . . . . *Sabia*.

Stamens 5, 2 only perfect and larger, the others reduced to scales; drupes globular; trees or erect shrubs . . . . . *Meliosma*.

### SABIA, Colebr.

Flowers hermaphrodite, rarely polygamous. Calyx 4-5-parted. Petals 4-5, opposite the sepals. Disk annular. Stamens 4-5, inserted at the base of the disk, all fertile; the filaments rather thick. Ovary-lobes 2, rarely 3, almost cohering at their axis, with 2 horizontal ovules in each. Carpels 1-2-seeded, usually compressed-kidney-shaped, drupaceous or dry. Albumen scanty. Cotyledons rather flat.—Scandent shrubs, with simple leaves. Flowers solitary or in cymes or panicles, usually small.

Leaves coriaceous; flowers minute, 2 lin. across . . . . . *S. limonacea*.  
Leaves herbaceous; flowers nearly 4 lin. in diameter . . . . . *S. viridissima*.

1. *S. limonacea*, Wall.—A large scandent shrub, all parts glabrous; leaves from lanceolate to oblong-lanceolate, rounded or acute at the base, 3-7 in. long, acute or acuminate, coriaceous; flowers minute, yellowish, on about 2 lin. long thick pedicels, forming elongate, reddish, leafy or leafless glabrous usually axillary panicles of the length of the leaves or longer; sepals obsoletely ciliate,

rotundate; petals broadly obovate, blunt, very shortly clawed, about a line long, 5-nerved; stamens finally as long as the petals; drupes compressed, almost rotundate-kidney-shaped, the stone tubercled.

HAB.—Chittagong.

2. *S. viridissima*, Kz.; H.f. Ind. Fl. ii. 3.—A shrub, all parts glabrous; leaves obovate to elliptically oblong, on a 6-8 lin. long petiole, acuminate at both ends, herbaceous, glabrous, 6-8 in. long; flowers small, white, on about 3 lin. long slender pedicels thickened upwards, forming 1 or 2 lax, glabrous, short panicles in the axils of the leaves; calyx glabrous; the lobes ovate, blunt; petals nearly 2 lin. long; style 3-cleft, the stigmas horse-shoe-shaped.

HAB.—Not unfrequent in the tropical and moister upper mixed forests of the Andamans, especially along the western coasts.—Fl. May.

### MELIOSMA, Bl.

Flowers hermaphrodite or polygamously dioecious. Sepals 4-5. Petals as many, very unequal, the 2 inner ones small and sometimes 2-cleft. Stamens 5, inserted outside to the base of the disk, very unequal, the 2 larger ones fertile, the 3 others without anthers. Ovary entire, 2-3-celled, with 2 horizontal or suspended ovules in each cell. Drupe almost obliquely globular, the stone bony or crustaceous, 1- or rarely 2-celled. Cotyledons folded.—Trees or shrubs, with alternate, simple or pinnate leaves. Flowers minute, in thyrsoid panicles.

1. *M. simplicifolia*, Bl.; H.f. Ind. Fl. ii. 5.—A large evergreen tree, 40 to 50 ft. high, all softer parts shortly tawny pubescent; leaves simple, obovate-lanceolate or obovate-oblong, tapering at base on a shortly pubescent petiole  $\frac{2}{3}$ -1 in. long, 8-10 in. long, shortly acuminate, entire or very remotely serrulate, thin chartaceous, glabrous, except the shortly tawny pubescent nerves beneath while young; flowers minute, white, very shortly pedicelled or almost sessile, racemose, forming terminal and axillary tawny puberulous or almost shortly tomentose panicles; bracts oblong, rusty-pubescent; sepals minutely puberulous; the outer 3 petals oblong, almost crenulate, the 2 inner ones 2-cleft and adnate to the stamen, so as to appear a single one; disk consisting of 3 variously lobed scales arising from the petals and forming a dome over the ovary; fertile stamens 2; drupes almost globular, the size of a small pea, succulent, smooth, black, 1-celled and 1-seeded; seed horse-shoe-shaped, as in *Menispermaceæ*, with a hollow process between.

HAB.—Tropical forests of Tenasserim.—Fl. March-Apr.

REMARKS.—Wood brown, rather light, coarsely fibrous, but rather close-grained; takes a good polish.

## ANACARDIACEÆ.

Flowers hermaphrodite or unisexual, usually regular. Calyx 3-7-cleft or -parted, rarely spathaceous or irregularly slit, the sepals sometimes wing-like enlarging, or the tube or base of tube engrossing and turning fleshy. Petals 3-7, rarely none, free or very rarely united with the torus, sometimes enlarging into wings. Disk usually annular, rarely the torus raised and stalk-like. Stamens usually twice as many as petals, usually inserted at the base of the disk, all perfect or variously imperfect; anthers dehiscing inwards. Ovary superior, usually 1-celled, with 1-3 styles, or 2-5-celled, or very rarely of 2 to 5 distinct carpels, with a solitary ovule in each cell, in male flowers reduced to 4 or 5 style-shaped rudiments. Fruit superior or very rarely half-inferior, free or adnate to the engrossed calyx-tube or disk, 1- or rarely several-celled, usually drupaceous and indehiscent. Seed erect, horizontal or pendulous. Albumen none or scanty. Radicle inferior or superior.—Trees or shrubs, rarely climbing, with alternate or rarely opposite, often crowded, simple or compound leaves. Stipules none. Flowers small, variously arranged.

An important order to the forester, the members of which are all woody. They abound in resinous, sometimes acrid, often poisonous principles. The mangoes, cashew nut, hog-plums, and pistacia nut are edible. Varnish is the produce of several members of this family. The bark of many is good for tanning; the timber, however, is inferior.

\* Ovary 1-celled; drupes 1-seeded.

× Leaves simple.

○ Calyx and petals remaining unchanged after flowering.

+ Calyx 3-5-parted or -toothed.

Stamens 1-5, 1 or 2 bearing anthers; style filiform; leaves alternate

*Mangifera.*

Stamens 3-8, all anther-bearing; style short; leaves opposite

*Bouea.*

Stamens 10; carpels 5-6; style short

*Buchanania.*

++ Calyx spathaceous; stamens inserted on the stalk-like torus

*Gluta.*

○○ Calyx-tube or its base engrossing, or either the sepals or the petals wing-like enlarging.

+ Calyx-tube or its base engrossing; sepals and petals remaining unchanged.

† Nut superior, seated on the much-engrossed fleshy calyx-base.

Stamens 8-10; torus stalk-like; style 1, filiform

*Anacardium.*

Stamens 5; disk annular, rather broad; styles 3

*Semecarpus.*

++ Fruit inferior, enclosed in the enlarged calyx-tube.

Petals valvate; styles 3

*Holigarna.*

Petals imbricate; style 1

*Drimycarpus.*

+++ Petals wing-like enlarging, the calyx-tube and sepals unchanged or nearly so.

- Stamens 5; drupe sessile . . . . . *Swintonia*.  
 Stamens numerous; drupe stalked . . . . . *Melanorrhoca*.  
 × × *Leaves pinnate to 3-foliolate*.  
   ○ Calyx-lobes wing-like enlarging; leaves pinnate . *Parishia*.  
   ○○ Calyx remaining unchanged; petals imbricate.  
     + Styles 3-4 in the female or hermaphrodite  
       flowers.  
 Erect trees or shrubs; ovule suspended from a free, erect, basilar  
 funicle . . . . . *Rhus*.  
 Trees; ovule suspended near the summit of the cavity . . . *Odina*.  
     + + Style 1; ovule suspended; climber . *Tapiria*.  
 \* \* *Ovary 2-5-celled; ovules pendulous; leaves pinnate*.  
 Flowers polygamous; styles 4 or 5, free at the summit . . *Spondias*.  
 Flowers hermaphrodite; styles 5, thick, connate at the top and  
 resembling ovaries . . . . . *Dracontomelum*.

## MANGIFERA, L.

Flowers polygamously dioecious. Calyx 4- or 5-parted, deciduous, imbricate. Petals 4 or 5, the nerve usually thickened at the middle, imbricate. Disk cushion- or stalk-like, lobed. Stamens 1 or 4-5, of which 1 or 2 are fertile. Ovary free, 1-celled, with a single ascending ovule; style lateral, filiform. Drupe almost kidney-shaped or ovoid, fleshy, the putamen fibrous-woody, 1-seeded; radicle inferior.—Trees, with alternate simple leaves. Flowers usually small, panicle.

\* *Petals and stamens free, the former inserted at the base of the cushion-like or cup-shaped disk.*

× Pedicels 3-6 lin. long, very slender . . . . . *M. longipes*.

× × Pedicels very short and thick; fertile stamen 1.  
 Panicle and calyx glabrous; petals about 3 lin. long; disk cup-shaped; drupes 2-3 in. long, acuminate; net-veination very lax and thin . . . . . *M. sylvatica*.

Panicle and calyx more or less puberulous; petals hardly 2 lin. long; disk 5-lobed; drupes 3-4 in. long, blunt; net-veination lax and thin . . . . . *M. Indica*.

Panicle and calyx densely pubescent; petals hardly 2 lin. long; disk 5-lobed; drupes 1-2 in. long, blunt; net-veination minute and elegant, strongly prominent on both surfaces . *M. caloneira*.

\* \* *Petals and stamens united with the base of the stalk-like torus, or rarely the latter wanting; leaves almost polished beneath* . . . . . *M. foetida*.

1. *M. longipes*, Griff.; H.f. Ind. Fl. ii. 15.—*Thayet-thee-nee*.

—An evergreen tree (50—60 + 15—30 + 4—6), all parts glabrous; leaves lanceolate or elliptically lanceolate, on a 1-2 in. long petiole thickened at the base, acuminate, 5-6 in. long, waved along the borders, coriaceous, beneath opaque and almost glaucescent, the lateral nerves copious and almost as thin as the copious conspicuous net-veination; flowers dioecious, small, whitish with yellow centre, on slender 3-6 lin. long puberulous pedicels, usually cymulose or racemulose, forming a slender puberulous lax terminal panicle peduncled or branched already from the base; bracts linear-subu-

late, ciliate; calyx 5-cleft to near the base, the lobes narrow-linear, acuminate,  $\frac{1}{2}$  lin. long, puberulous outside; petals linear-lanceolate, twice as long as the calyx-lobes, subulate-acuminate, reflexed from the middle, traversed by 5 yellow raised veins; stamens 2-3, one only fertile; the filament slender, inserted to the inner margin of the conical 5-lobed disk.

HAB.—Frequent in the swamp forests of the Pegu plains; also in Tenasserim.—Fl. Dec.-Jan.—s.—SS.—All.

2. *M. sylvatica*, Roxb.; H.f. Ind. Fl. ii. 15.—*Hseng-neng-thayet*.—A large evergreen tree, 60 to 80 ft. high, all parts quite glabrous; bark grey, about 2 in. thick, more or less irregularly cracked, otherwise rather smooth; leaves lanceolate to oblong-lanceolate, on a long petiole thickened at the base, acuminate, entire, chartaceous or almost coriaceous, glabrous, usually rather opaque on both sides, the nerves much more curved than in the following species, copiously but laxly net-veined between; flower rather small, white, shortly pedicelled, forming an ample terminal rather slenderly branched glabrous panicle longer than the leaves; calyx glabrous, the lobes nearly a line long; petals linear, rather acute and twisted, about 3-4 times longer than the calyx-lobes; disk annular, villous, slightly grooved and united with the torus; stamen 1, fertile, inserted inside the disk; drupes ovate, obliquely acuminate, nearly as large as the common mango, much compressed, fleshy, smooth, when ripe yellow, containing a woody-fibrous large putamen.

HAB.—Rare in the tropical forests of the Martaban hills.

3. *M. Indica*, L.; H.f. Ind. Fl. ii. 13; Bedd. Sylv. Madr. t. 162; Brand. For. Fl. 125.—*Thayet*.—An evergreen tree (40—60 + 15—30 + 4—8), all parts glabrous; leaves crowded towards the end of the branchlets, elliptically-oblong to oblong-lanceolate, on a rather long petiole, about 6-10 in. long, acuminate to almost blunt, often waved along the borders, coriaceous, glossy above, the nerves strong, net-veination copious and conspicuous, but lax; flowers small, on very short thick pedicels, yellowish with reddish streaks, forming a large puberulous terminal panicle branched already from the base and in length much exceeding the leaves; calyx densely puberulous, the lobes about a lin. long; petals twice as long as the calyx-lobes; disk 5-lobed, glabrous, the lobes fleshy, as large as the ovary, greenish or yellow, bearing usually 2-4 rudimentary very small anthers; fertile stamen 1, very rarely 2; drupes ovoid or oblong-kidney-shaped, the size of a goose's egg, or smaller or larger, slightly compressed in the cultivated, much so in the wild form, fleshy, sappy, smooth, green-yellow to reddish, containing a large fibrous-woody 1-celled putamen.

HAB.—Not unfrequent in the tropical and lower mixed forests all over Burma from Arracan and Pegu down to Tenasserim and the Andamans; also generally cultivated all over the country.—Fl. Feb.-March; Fr. May-July.—IX s.—SS.=∞.

REMARKS.—Wood yellowish or dull-grey, coarsely fibrous, rather loose-grained, light; soon decays if exposed to wet. Heart-wood about 3-4 in. across, close-grained and much more durable, but takes only an indifferent polish. Used occasionally for cabinet-work, for house- and coach-building purposes, and for packing-cases. Exudes a yellowish gum.

4. *M. caloneura*, Kz.; H.f. Ind. Fl. ii. 14.—An evergreen tree (40—60+15—25+4—6), all parts glabrous; leaves oblong to oblong-lanceolate, 3-5 in. long, on an almost marginate petiole 1 to  $\frac{1}{2}$  in. long, bluntish acuminate, coriaceous, glabrous, minutely and elegantly net-veined between the thin lateral nerves, the mid-rib broad and on both sides prominent; flowers small, sessile or nearly so, forming a large terminal tomentose panicle longer or shorter than the leaves; calyx pubescent; petals lanceolate, acute, reflexed, about a line long, ciliolate, white, traversed by a citroon-yellow longitudinal line; stamen 1, fertile, the anther purple; disk 5-lobed, smooth; drupes ovoid-kidney-shaped, the size of a hen's egg, smooth, blunt, orange-yellow or yellow, acid-sweet, almost terete, containing a large thin-wooded 1-seeded putamen.

HAB.—Frequent in the low and lower mixed forests of the eastern and southern slopes of the Pegu Yomah.—Fl. Dec.-Jan.; Fr. May.—s.xl.—SS.=Lat. p. Dil. All.

5. *M. foetida*, Lour.; H.f. Ind. Fl. ii. 18.—*La-mote*.—A large evergreen tree, all parts quite glabrous; leaves oblong- to elliptically-lanceolate, on a robust 1-2 in. long petiole thickened at the base, shortly acuminate or apiculate, firmly coriaceous, 6-10 in. long, glabrous, glossy and almost polished beneath, the nerves very strong but blunt, the net-veination obsolete; flowers small, on 1-2 lin. long thick pedicels, forming a reddish, robust, glabrous, terminal panicle as long or longer than the leaves; calyx glabrous, the lobes oblong, blunt, 2 lin. long; petals twice as long, linear, acute; stamens 5, at the base united with the short torus, all but 1 or occasionally 2 sterile; drupes ovoid-oblong, very large, of a dull yellowish grey, smooth and a little pruinous, rather blunt, strongly smelling, containing a large, woody, fibrous, 1-seeded putamen.

HAB.—Southern Tenasserim, cultivated.

## BOUEA, Meisn.

Flowers polygamous. Calyx short, 3-5-parted, the lobes valvate. Petals 3-5, imbricate. Disk very short. Stamens 3-8, inserted on the disk, all fertile. Ovary free, sessile, with a solitary ascending

ovule; style short, terminal. Drupe fleshy, the putamen thin, woody, fibrous, indehiscent, 1-seeded. Seed nearly erect; radicle inferior.—Trees, with opposite, simple leaves. Flowers small, in terminal or axillary panicles.

Panicle small, sessile or nearly so, quite glabrous; petals  $\frac{1}{2}$  lin. long. *B. oppositifolia*.

Panicle large, long-peduncled, puberulous; petals a lin. long or longer . . . . . *B. Burmanica*.

1. *B. oppositifolia*, Meisn.—*Mayan*.—An evergreen tree (40—50+20—25+4—6), all parts glabrous; bark dark-grey, narrowly fissured; leaves more or less lanceolate, on a rather long petiole, long and bluntish acuminate, 4-5 in. long, coriaceous, glabrous, glossy beneath, the nerves impressed beneath; flowers small, on 1-1 $\frac{1}{2}$  lin. long pedicels, pale yellow or greenish white, forming a small terminal glabrous almost sessile thyrsoid panicle shorter than the leaves; calyx slightly puberulous, 4-5-toothed, the teeth oblong, acute; petals 4 or 5, about  $\frac{1}{2}$  a lin. long, linear-oblong, blunt; stamens 5, all fertile; filaments short, broad at the base; drupes ovoid-oblong and somewhat kidney-shaped, the size of a small pullet's egg, somewhat compressed, smooth, yellow (or bluish-black) sappy, acid or sweet, containing a thin, woody, 1-seeded putamen.

HAB.—Rather rare in the tropical forests of Martaban and Tenasserim, frequent in those of the Andamans; also generally cultivated all over Burma.—Fl. Jan.-Febr.; Fr. Apr.-May.—A.—SS.—*Metam.* SiS.

REMARKS.—Sap-wood greyish, very coarsely fibrous and loose-grained; heart-wood large, blackish or reddish, ebony-like, hard, close-grained, rather heavy.

2. *B. Burmanica*, Griff.—An evergreen tree, the very young shoots minutely puberulous; leaves lanceolate or elliptically lanceolate, on a longer or shorter glabrous petiole, longer or shorter bluntish acuminate, coriaceous, glabrous, in a dried state opaque, the lateral nerves impressed on both sides, the midrib and petiole of the very young leaves minutely puberulous; panicles large, on a 2-4 in. long peduncle, terminal, puberulous, partially more or less glabrescent; flowers larger than in the preceding, on a slender 3 lin. long puberulous pedicel, racemulose; calyx minute, puberulous, truncately toothed; petals obovate-oblong, somewhat acute, more than a line long; stamens usually 8, all fertile, the filaments short and filiform, a little puberulous; drupes ovoid-reniform, the size of a small pullet's egg, smooth, fleshy, acid, purplish black (?), containing a thin, woody, 1-seeded putamen.

HAB.—Tenasserim, in Thoun-green.—Fl. March.

## BUCHANANIA, Roxb.

Flowers hermaphrodite. Calyx short, 3-5-toothed, persistent,

imbricate. Petals 5, imbricate. Disk orbicular, 5-crenate. Stamens 10, inserted to the base of the disk, free. Ovary-carpels 5-6, distinct, inserted on the concave summit of the disk, of these but one fertile with a solitary ovule suspended from a free basilar funicle. Drupe small, containing a bony or crustaceous 2-valved putamen. Radicle superior.—Trees, with alternate simple leaves. Flowers small, in terminal and axillary panicles.

\* *Leaves and panicles more or less tomentose or pubescent.*

○ Leaves on both sides tomentose or pubescent, large.

Panicles stout and stiff; flowers 2 lin. in diameter, sessile and crowded . . . . . *B. latifolia.*

Panicles slender, grey-pubescent; flowers hardly a line across, pedicelled and lax . . . . . *B. laxiflora.*

○ ○ Leaves small, puberulous beneath, glossy above, retuse, the petiole 1.2 lin. long . . . . . *B. Siameusis.*

\*\* *Leaves glabrous and more or less glossy, usually fuscescent in drying; panicles glabrous or puberulous.*

○ Panicles rusty-puberulous . . . . . *B. glabra.*

○ ○ Panicles, etc., quite glabrous; flowers pedicelled.

Leaves equally decurrent at the base; pedicels very slender; petals a line long, reflexed; panicles longer than the leaves . . . . . *B. arborescens.*

Leaves equally decurrent at the base; pedicels short and stout; petals  $\frac{1}{2}$  lin. long, erect; panicles as long or longer than the leaves . . . . . *B. acuminata.*

Leaves very unequally decurrent at the base, large; pedicels very slender; petals a line long, reflexed; panicles crowded, shorter than the leaves . . . . . *B. lancifolia.*

1. *B. latifolia*, Roxb.; H.f. Ind. Fl. ii. 23; Bedd. Sylv. Madr. t. 145; Brand. For. Fl. 127.—*Lambo* or *Lone-hpo*.—A tree (30—40 + 20—25 + 3—6), shedding leaves in H.S., the younger parts more or less villous-pubescent; leaves oblong to elliptically oblong, on a short, thick, flattened petiole, about 6-7 in. long, blunt, entire, coriaceous, while young villous-tomentose beneath and a little pubescent above, afterwards glabrous above and beneath, shortly tomentose especially on the strong irregular nerves and net-veination; flowers small, whitish, on short and thick pubescent pedicels or almost sessile, clustered-racemose, forming several dense-branched tomentose panicles at the end of the branchlets; calyx sparingly stiff-hairy; petals oblong, acute, about a line long; filaments slender, glabrous; disk yellow, deeply 10-crenate; ovary-carpels hispid-pubescent, only one of them fertile; drupes almost ovoid-reniform, the size of a small cherry, slightly compressed, smooth, purplish black, containing a very hard 1-seeded putamen.

HAB.—Common in the open and dry forests, especially the Eng forests, all over Burma from Ava and Martaban down to Tenasserim.—Fl. March; Fr. Apr.—l.—SS. = *Lat.* Dil. Metam. CaS.

REMARKS.—Wood light and soft, rather tough, but not used. Said to give good charcoal. □ = 36 pd.

2. *B. laxiflora*, Kz.; H.f. Ind. Fl. ii. 24.—A deciduous tree,

all the younger parts greyish tomentose; leaves ovate-oblong, obtuse at the base, about 6-7 in. long, on a strong petiole  $\frac{1}{2}$  an in. long, coriaceous, entire, shortly tomentose, glabrescent above; flowers minute, on short but slender pedicels, forming a lax spreading much-branched greyish or tawny pubescent panicle at the end of the branches; bracts small, subulate; calyx greyish puberulous; the lobes oblong, acute, hardly  $\frac{1}{4}$  lin. long; petals obovate-oblong, hardly a line long; filaments slightly puberulous; ovary-carpels glabrous.

HAB.—Martaban, and Pegu above Rangoon.—Fl. Jan.-Febr.—SS.—Ca. Lat. (P).

3. *B. Siamensis*, Miq.—An evergreen tree, the young branchlets brown pubescent; leaves small, obovate to elliptical, rounded or acute at the base, on a very short stout pubescent petiole, more or less retuse or rounded at the apex, 1-2 in. long, firmly coriaceous, glossy dark-green above, beneath minutely puberulous and more or less glabrescent, the margins usually recurved; fruiting racemes about twice as long as the leaves, puberulous, axillary; drupes on stout peduncles about a line long, the size of a very large pea, almost obcordate-ovoid, slightly compressed, glabrous.

HAB.—Adjoining Siamese province of Radbooree.—Fr. H.S.

4. *B. glabra*, Wall; H.f. Ind. Fl. ii. 23.—A tree; leaves broadly elliptical or oblong to almost orbicular, rounded at the base, on a short petiole  $\frac{1}{2}$  in. long, blunt or rounded at the apex, very coriaceous, the upper-side raised between the nerves, the under-side strongly nerved and net-veined, shining; flowers about a line in diameter, very shortly pedicelled, rather crowded, forming a spreading rusty puberulous glabrescent panicle shorter than the leaves; unripe fruit glabrous.—(After Hooker.)

HAB.—Upper Tenasserim.

5. *B. arborescens*, Bl. (*B. lucida*, Bl.; H.f. Ind. Fl. ii. 24).—An evergreen tree, all parts glabrous; leaves obovate to obovate-oblong, acuminate at the base and narrowed into the 1-2 in. long petiole, rounded or blunt, 4-7 in. long, coriaceous, fuscous-brown and glossy, net-veined on both sides; flowers about  $1\frac{1}{2}$  lin. across, white, slenderly pedicelled, lax, forming glabrous lax panicles usually longer than the leaves; sepals orbicular; petals elliptical, blunt, a line long, reflexed; drupes globose, compressed, glabrous, the size of a large pea.

HAB.—Tenasserim.

6. *B. acuminata*, Turcz.—A small evergreen tree, all parts glabrous; leaves obovate to obversely lanceolate, on a slender petiole varying much in length and up to 1 in. long, acuminate at both



puberulous panicles usually much shorter than the leaves; calyx about 2 lin. long, cylindrically spatulate and irregularly splitting, puberous; petals linear-spathulate, nearly twice as long as the calyx; stamens 4, exserted, the filaments glabrous, filiform, up to the middle adnate to the stalk-like torus; berries drupe-like, much deformed-globose and depressed, roughish.

HAB.—Coasts of Tenasserim from Tavoy southwards.—Fl. Nov.

2. *G. elegans*, Kz.; H.f. Ind. Fl. ii. 22:—A small evergreen tree, all parts glabrous; leaves lanceolate to oblong-lanceolate, tapering at the base, on a slender 1-2 in. long petiole, shortly and bluntish acuminate, thin coriaceous, glabrous, the nerves and net-veination conspicuous on both sides; flowers rather small, white, on 3-6 lin. long rather thick or slender glabrous pedicels, forming rather small, slender, glabrous corymbose panicles at the end of the branchlets or in the axils of the upper leaves; calyx about 3-4 lin. long, spatulate, scarlet, veined, glabrous; petals 4 or 5, twice the length of the calyx, linear-lanceolate, bluntish; stamens 4 or 5; the filaments slender and united at the base with the petals and the torus.

HAB.—Tenasserim, along the coasts.

REMARKS.—Wood good for furniture, and when steeped in ferruginous mud turns jet black, looking like ebony. Used also for building purposes, boxes, &c., and for dyeing (with different mordants, from orange to black).

*N. B.*—*G. longipetiolata*, Kz.—An evergreen small tree (25—30 + 10—15 + 3—4) of the coast-forests of the Andamans, has the leaves about half a foot long or longer, the petioles stronger, up to 2 in. long. Flowers and fruits still unknown.

### ANACARDIUM, Rottb.

Flowers polygamous. Calyx 5-parted, deciduous, erect. Petals 5, imbricate. Torus stalk-like, filling up the base of the calyx. Stamens 8-10, unequal, all or some of them fertile, the base of the filaments united with the torus. Ovary free, sessile, with a solitary ovule ascending from a very short funicle; style excentric, filiform. Nut kidney-shaped, supported by the very large pear-shaped hypocarp (the engrossed torus and calyx-base), indehiscent the pericarp thick, cellular, oily.—Trees or shrubs, with alternate simple leaves. Flowers rather small, in terminal bracted corymbose panicles.

1. *A. occidentale*, L.; H.f. Ind. Fl. ii. 20; Bedd. Sylv. Madr. t. 163.—*Thee-koh-thayet*.—An evergreen (25—30 + 8—15 + 2—3) all parts glabrous; bark rough and cracked; leaves obovate to obcordate-oblong, on a short, thick and broad petiole, rounded or truncate at the base, 5-7 in. long, blunt or almost repand, entire, coriaceous,

glabrous, the nerves and net-venation conspicuous on both sides; flowers small, on  $1\frac{1}{2}$ -2 lin. long minutely puberulous pedicels, forming bracted terminal branched more or less minutely greyish puberulous panicles; bracts lanceolate, puberulous; calyx 5-cleft to near the base; petals linear-lanceolate, revolute, pale-yellowish with pink streaks, 6-7 lin. long; stamens usually 9 or 10, one of them much longer; nut kidney-shaped, blunt, the size of a plum, compressed, seated on a fleshy glabrous orange-coloured edible hypocarp of the size and shape of a small pear.

HAB.—In the beach forests and along sandy sea-shores and dunes of Chittagong and Tenasserim. Also cultivated in villages.—Fl. Nov.-Decb.—l.—SS.—Aren. Ca.

REMARKS.—Wood dark-brown, excellent for charcoal. Exudes an astringent pellucid gum like gum-arabic, forming a good varnish. The juice issuing from incisions in the bark yields an indelible marking ink. The pericarp of the nuts produces a black acrid oil (cardole or cashew apple-oil), while the seeds themselves yield a very good edible oil.

### SEMECARPUS, L.f.

Flowers polygamous. Calyx 5-cleft, the lobes deciduous, imbricate. Petals 5, valvate or imbricate. Stamens 5, inserted to the base of the annular rather broad disk. Ovary superior, sessile, with a solitary ovule suspended from the summit of the cavity; styles 3, terminal. Nut kidney-shaped, seated on the very thick cup-shaped or turbinate hypocarp (engrossed base of the calyx); the pericarp thick, hard, cellular and resinous. Seed pendulous. Radicle superior.—Trees, with alternate simple leaves. Flowers small, in terminal or lateral bracted panicles.

\* Nut much exerted from the fleshy hypocarp. Ovary quite superior.

× Ovary tomentoso or pubescent.

+ Hypocarp (enlarged fleshy base of calyx) as large or nearly as large as the nut.

Leaves coriaceous, blunt, densely pubescent or tomentoso and strongly net-veined beneath; nut not or almost not oblique. *S. Anacardium*.

Leaves (full grown) chartaceous, sharply acuminate, softly pubescent beneath, the net-venation faint; nut very oblique. *S. panduratus*.

+ + Hypocarp very small.

Leaves coriaceous, acuminate, quite glabrous or pubescent and very glaucous beneath, the net-venation strong; nut very oblique,  $1\frac{1}{2}$ -1 in. across. *S. heterophyllus*.

× × Ovary quite glabrous.

A tree; leaves chartaceous, acuminate, glabrous; panicles quite glabrous; nut an in. broad. *S. subpanduriformis*.

A simple-stemmed shrub with a large subterranean trunk; panicles densely puberulous; nut only 3-4 lin. long. *S. subracemosus*.

\*\* Nut adnate to the hypocarp, free only at the very apex. Ovary superior.

Leaves glabrous, or pubescent and whitish beneath; nut velvety, barely exerted from the sappy veined puberulous hypocarp. *S. albescens*.

1. *S. Anacardium*, L.f.; Bedd. Sylv. Madr. t. 146; Brand. For. Fl. 124.—A leaf-shedding tree, 30-40 ft. high, all the younger parts shortly tomentose or densely puberulous; leaves crowded at the end of the branches, obovate or oblong (those of the shoots or young trees not seldom elongate and cuneate-obovate with a short point), rounded or obtuse at the base, on a strong 1-2 in. long densely puberulous petiole,  $\frac{1}{2}$  to  $1\frac{1}{2}$  ft. long, blunt or mucronate, entire, harshly coriaceous, glabrescent above, the under-surface covered with a thin grey velvety tomentum, the net-veination very coarse and prominent; flowers small, dull greenish yellow, the female ones on 1-3 lin. long very thick tomentose pedicels, racemulose and nearly twice larger than the clustered almost sessile male ones, both forming a terminal, ample and robust, tomentose panicle of the length of the leaves or shorter; males: petals about a line long, oblong-lanceolate; stamens 5, the filaments slender; ovary reduced to a tuft of hairs; females and hermaphrodites: petals about 2 lin. long; stamens often incomplete; ovary densely appressed tawny hispid; styles 3; nuts about an in. long, about as long as broad, smooth, black, shining, almost broadly oval and somewhat compressed, notched-obtuse at the top, the hypocarp turbinate, fleshy, yellow, smooth, nearly as large and thick as the nut itself.

HAB.—Chittagong. Said to occur also in Burma.—Fl. H.S.; Fr. C.S.—1.

REMARKS.—Wood grey or reddish white, soft and useless. Nuts used as a mordant, and for making an indelible marking-ink. Yields a bright gum.

2. *S. panduratus*, Kz.—*Chyay-pen*.—A tree (50—60 + 20—30 + 4—6), leafless during H.S., all younger parts pubescent or shortly pilose; bark about 1-1 $\frac{1}{4}$  in. thick, rather smooth, ash-grey; cut red; leaves large, 1-1 $\frac{1}{2}$  ft. long, cuneate-obovate, acute or obtuse at the narrowed base, on a 1-2 in. long puberulous petiole, shortly acuminate or apiculate, entire, almost chartaceous, above (except the puberulous midrib) glabrous, beneath softly and shortly pubescent, the net-veination thin and lax; flowers unknown; nuts very obliquely oblong, longer than broad, produced in a short, oblique, bluntish point, glossy, the hypocarp obversely conical, fleshy, smaller than the nut itself.

HAB.—Frequent in the upper mixed forests all over Pegu and Martaban, up to 2,000 ft. elevation.—Fr. C.S.—1.—SS.—Si S., Metam.

REMARKS.—Wood white, turning pale-brown, rather light, coarsely fibrous and rather close-grained, soft, useless, and soon attacked by xylophages. Yields a black resin, and the nuts yield an indelible ink.

3. *S. heterophyllus*, Bl.—An evergreen tree (30—40 + 8—15 + 4—5), the branches stout and puberulous while young; leaves elongate-oblancoelate to oblanceolate-oblong, acute at the base, on a

thick petiole up to  $\frac{1}{2}$  in. long, 8-12 in. long (in saplings up to 2 $\frac{1}{2}$  ft. long and of thinner texture), shortly and abruptly acuminate, coriaceous, glabrous, or puberulous on the whitish under-surface, the nerves and net-veination strongly prominent; flowers largish, on velvety stout pedicels not exceeding a line in length, forming stout tawny-velvety terminal panicles; calyx tawny-velvety, the lobes triangular; petals ovate-lanceolate, acute, nearly 2 lin. long, glabrous; ovary densely tawny tomentose; nut very obliquely oval, somewhat longer than broad, up to 1 $\frac{1}{2}$  in. long, glabrous and glossy, the hypocarp comparatively small, usually glabrous or glabrescent.

HAB.—Rare in the beach forests of the Andamans.—Fr. March-Apr.

4. *S. subpanduriformis*, Wall.; H.f. Ind. Fl. ii. 35.—A leaf-shedding tree (40—60 + 20—30 + 4—6), all parts quite glabrous; leaves cuneate-obovate to cuneate-oblong, obtuse or acuminate at the narrowed base,  $\frac{1}{2}$ -1 ft. long, on a 1-2 in. long petiole, acuminate, entire, almost chartaceous, glabrous, glaucous beneath, the nerves and net-veination thin but sharply prominent; flowers greenish, small, on 1-2 lin. long glabrous and slender pedicels, racemulose, forming a terminal much-branched slender quite glabrous panicle shorter than the leaves; calyx-teeth broad and acute; petals more than a lin. long, ovate-lanceolate, acuminate, disk tawny or yellowish hispid; ovary quite glabrous; styles 3, 2-cleft at the apex; stamens 5, the filaments slender.

HAB.—Frequent in the moister upper mixed forests of Arracan; also in Chittagong.—Fr. Octob.—l.—SS.—SiS.

5. *S. subracemosus*, Kz.—A simple-stemmed shrub, 2-3 ft. high, with a woody subterranean trunk, the shoots tawny puberulous; leaves distant, oblong to obovate-cuneate, somewhat decurrent on the broad  $\frac{1}{2}$  to 1 in. long glabrous petiole, blunt or acute, about 3-4 in. to a foot long, entire, thin chartaceous, glabrous and shining above, while young minutely puberulous beneath, sea-green, the lateral parallel nerves and lax net-veination conspicuous; flowers small, greenish white, on very short densely puberulous pedicels, clustered-cymulose, forming very slender tawny puberulous or almost pubescent narrow raceme-like panicles in the axils of the leaves and often collected in branched panicles at the end of the branches; calyx puberulous; petals about a line long, valvate; stamens 5, all fertile, the filaments capillary; disk shortly hispid-tomentose; ovary glabrous, with 3 thick styles, the stigmas almost capitate; nuts small, ovoid-kidney-shaped, black, only 3-4 lin. long, the engrossed fleshy hypocarp nearly as large, yellow.

HAB.—Prome District.—Fl. H.S.

6. *S. albescens*, Kz. (*Holigarna albicans*, H.f. Ind. Fl. ii.

38).—An evergreen tree (50—60+25—30+4—6), glabrous, or the branchlets and younger parts all velvety pubescent; leaves elongate-obovate to cuneate-lanceolate and almost oblong, on a strong tomentose or glabrous petiole  $\frac{1}{2}$ -1 in. long, 7-12 in. long, shortly and bluntish acuminate, rounded or obtuse at the narrowed base, entire, coriaceous, above glossy, glabrous, or the midrib above minutely pubescent, and beneath covered with a thin, white, velvety tomentum intermixed with short, soft hairs, the nerves and lax net-veination conspicuous and yellowish; flowers small, on hardly a line long densely pubescent pedicels, racemulose, forming a terminal densely tawny-velvety panicle usually shorter than the leaves; calyx minute, pubescent; petals valvate or nearly so, about a line long, shortly pubescent; ovary densely appressed hirsute, with 3 thick glabrous stigmas; disk narrow, glabrous; stamens 5, usually 1 or 2 of them abortive and longer than the others; filaments short and broad. Ovary densely tawny-hispid; nuts oblique, broader than long, only the top exserted from the fleshy yellowish orange-veined minutely puberulous edible hypocarp.

Var. 1, *ALBESCENS* PROPER; leaves puberulous beneath.

Var. 2, *GLABER*; all parts, also the leaves beneath, glabrous.

HAB.—Not unfrequent in the tropical forests of Martaban down to Tensasirim; rather rare in those of the Pegu Yomah, up to 3,000 ft. elevation.—Fl. Jan.-Febr.; Fr. March-Apr.—s.—SS.—*Metam.* SIS.

REMARKS.—Exudes a black varnish.

## DRIMYCARPUS, H.f.

Flowers polygamous; calyx 5-lobed, imbricate; petals 5, free, imbricate. Stamens 5, inserted at the base of the annular rather broad disk. Ovary inferior, with a solitary ovule attached to the wall of the cell; style 1, very short. Berry inferior, fibrous-fleshy, resinous, the endocarp coriaceous, 1-seeded.—Trees, with alternate simple leaves, the petiole without glands or stipules. Flowers small, in racemes or panicles.

1. *D. racemosus*, Bth. & H.f. Ind. Fl. ii. 36.—An evergreen tree, all parts glabrous; leaves oblong- to linear-lanceolate, acute at the base, on a thick  $\frac{1}{2}$  an in. long petiole, finely but shortly acuminate, more or less waved, coriaceous, 4-8 in. long, quite glabrous, more or less glaucescent beneath, the nerves and net-veination prominent and conspicuous; flowers white, small, the male ones clustered, the hermaphrodite ones on slender puberulous pedicels and racemulose, both forming axillary, short, tawny-pubescent panicles branch already from the base; calyx 5-cleft, the lobes oblong-lanceolate, acute; petals ovate; stamens 5, the filaments short; berry drupe-

like, obliquely and transversely oval, the size of a large cherry, 1-seeded, when ripe red, acid-juicy and fibrous-fleshy.

HAB.—Rather rare in the tropical forests of the Pegu Yomah, especially along the eastern slopes; also Chittagong.—Fl. Febr.-March; Fr. June-July.—s.—SS.—SiS.

### HOLIGARNA, Ham.

Flowers polygamous. Calyx 5-toothed, imbricate; petals 5, slightly cohering at the base and with the filaments, valvate; stamens 5, inserted at the base of the annular rather broad disk. Ovary inferior, with a solitary ovule suspended from the summit of the cavity; styles 3, terminal. Nut drupe-like, inferior, somewhat compressed, resinous-fleshy, the putamen coriaceous.—Trees, with alternate simple leaves, the petiole furnished with glands or barb-like stipules above the middle. Flowers small, in axillary and terminal racemes or panicles.

Leaves glabrous, gradually acuminate; nut entirely enclosed in the calyx

Leaves softly pubescent or puberulous beneath, cuspidate; apex of nut exposed, resembling a convex disk . . . . . *H. longifolia*.

of nut exposed, resembling a convex disk . . . . . *H. Helferi*.

1. *H. Helferi*, Hook. f. Ind. ii. 37. (*Semecarpus Grahamii*, Kz.; *H. longifolia*, H. f. Ind. Fl. ii. 37, not of Roxb.).—An evergreen tree (30—50 + 15—30 + 3—5), the young parts all pubescent; leaves elongate obovate-lanceolate, 1-2½ ft. long, narrowed towards the acuminate base, on a ½-1 in. long strong petiole, furnished at both sides with a pair of barb-like appendages, shortly acuminate, entire, coriaceous, while young softly pubescent beneath, turning glaucous and obsoletely puberulous, glabrous above, the nervature as in *S. longifolia*; flowers small, almost sessile, densely rusty-tomentose, forming a densely rusty-tomentose rather short elongating panicle in the axils of the upper leaves; bractlets linear, glabrous inside, deciduous; calyx-lobes lanceolate, on both sides (inside less) rusty pubescent; pedicels very short, but elongating in fruit to more than ½ an in. and becoming straight and strong; nut elliptically obovate, 1-seeded, only the upper part exposed and forming a broad convex disk nearly 2 lin. across at the top of the engrossed glabrescent not fleshy calyx and encircled with the rusty-tomentose remnants of the calyx-limb.

HAB.—Frequent in the tropical forests of Martaban and of the Pegu Yomah; Tenasserim.—Fl. Febr.-March; Fr. Apr.-May.—s.—SS.—Metam.—SiS.

REMARKS.—Wood rather heavy, brown, soft, close-grained, perishable, and soon attacked by xylophages. Yields a black varnish.

### SWINTONIA, Griff.

Flowers hermaphrodite; calyx 5-lobed, imbricate. Petals 5,

adnate to the torus, imbricate, after flowering much enlarging and wing-like. Torus elongate, cylindrical, bearing the petals at its middle and the 5 stamens at the apex. Ovary sessile, with a solitary ovule suspended from the free basilar funicle. Drupes sessile and adnate to the wing-like petals, coriaceous. Seed solitary.—Trees, with alternate simple leaves. Flowers small, interminal large but slender panicles.

Leaves uniformly green and glossy; pedicels 3-5 lin. long, the net-veination conspicuous . . . . . *S. Griffithii*.  
 As preceding but leaves dark-brown, the netveination obsolete . . . . . *S. Helferi*.  
 Leaves glaucous and opaque beneath; pedicels  $\frac{1}{2}$ -1 lin. long; petals hardly a line long; drupes oblong . . . . . *S. Schwenckii*.

1. *S. Griffithii*, Kz.; H.f. Ind. Fl. ii. 26.—A lofty evergreen tree, all parts quite glabrous; leaves crowded towards the end of the branchlets, lanceolate or oblong-lanceolate, bluntish acuminate, on an 1-1½ in. long slender petiole, 5-6 in. long, entire or slightly waved, thin coriaceous, glossy and glabrous, uniformly green, the net-veination faint; flowers rather large, pale-yellowish, on 3 to 5 lin. long strong pedicels thickened upwards, laxly cymose and forming a terminal ample but slender glabrous panicle longer than the leaves; calyx-tube cyathiform, continuous with the pedicel, the lobes very short, rounded; petals linear-lanceolate, nearly 3 lin. long, very soon enlarging; style as long as the obliquely ovoid ovary, thick, with a discoid-capitate stigma; drupes (unripe) obovate, sessile, adnate to, and supported by, the 5 spreading wing-shaped linear-lanceolate purple petals.

HAB.—Tenasserim.

2. *S. Helferi*, H.f. Ind. Fl. ii. 26.—An evergreen tree, very near to the preceding, but the branchlets stouter; leaves narrowly lanceolate, acute at the base, on a long slender petiole, bluntish acuminate, 6-10 in. long by 1-1½ broad, copiously nerved (nerves 25-30 pairs), waved-bordered, drying dark-brown; panicles much longer than the leaves, lax, spreading, quite glabrous; flowers pedicelled; drupes obovoid,  $\frac{1}{2}$  in. long, the subtending petals reflexed, 2 in. long, linear, blunt, veined, glabrous.—(After Hooker.)

HAB.—Tenasserim or Andamans.

3. *S. Schwenckii*, T. et B.; H.f. Ind. Fl. ii. 26.—*Thayet-san*.—An evergreen tree (80—120+60—70+8—10), all parts quite glabrous; bark about 3 lin. thick, rather smooth, finely transversely wrinkled; cut dry, brown; leaves oblong- to elliptically-lanceolate, on a very slender petiole 1½-1 in. long, bluntish acuminate, 3½-5 in. long, entire, firmly chartaceous or membranous, glabrous, glossy and dark-green above, beneath whitish or glaucescent, the nerves and net-veination thin, but rather conspicuous; flowers minute, yellowish

white, on less than a line long slender not thickened pedicels, very numerous, cymulose-racemose, and forming a very ample slender glabrous panicle at the end of the branches and in the axils of the upper leaves and usually 3-4 times longer than them; calyx very short, hemispherical, the lobes rotundate, obsoletely ciliolate; petals pubescent, about a line long, oblong; drupes oblong, the size of a bean, blunt, smooth and red, adnate to, and supported by, the 5 oblong-linear reflexed 2 in. long longitudinally nerved purplish wing-shaped petals.

HAB.—Very frequent in the tropical forests of Martaban down to Tenasserim, less so in those of the Pegu Yomah.—Fl. Febr.-Apr. ; Fr. May.—s:l.—SS.==  
SiS. *Metam.*

REMARKS.—Wood white, soft.

### MELANORRHCEA, Wall.

Flowers hermaphrodite. Sepals 5, hood-like cohering, deciduous, valvate. Petals 5 or 6, imbricate, enlarging and becoming wing-shaped in fruit. Disk thick, hemispherical. Stamens numerous, without order inserted on the torus, the filaments capillary. Ovary stalked, with a solitary ovule suspended from the free basilar funicle ; style almost lateral. Drupe coriaceous, stalked, supported by the 5 wing-shaped spreading petals. Seed solitary.—Trees, with alternate simple leaves. Flowers middling-sized, in axillary panicles.

Leaves and panicles glabrous, or the latter puberulous ; fruit-stalk nearly 1½ in. long, slender . . . . . *M. glabra*.  
Leaves pubescent beneath ; panicle densely villous ; fruit-stalk short and thick . . . . . *M. usitata*.

1. *M. glabra*, Wall. ; H.f. Ind. Fl. ii. 25.—*Thit-say-pen*.—A middling-sized tree, the younger branchlets and leaf-buds tawny puberulous ; leaves cuneate-oblong, decurrent on the short thick puberulous petiole, blunt or almost retuse, 6-10 in. long, entire, when full grown coriaceous and quite glabrous, the lateral nerves strong, the net-veination small and conspicuous ; flowers white, middling-sized, on slender puberulous pedicels ½ an in. long, forming lax slender long-peduncled usually glabrous panicles in the axils of the upper leaves and longer than them ; sepals white, lanceolate, puberulous, 4-5 lin. long, only at the base free, hood-like cohering at the apex ; petals lanceolate, acute, ciliate, puberulous outside, about 5 lin. long ; drupes as large as a cherry, globose or spheroid, on a very slender 1-1½ in. long stalk, red, smooth and slightly pruinous, supported by the 5 wing-shaped linear-oblong to oblong purplish stellately spreading petals about 2 in. long.

HAB.—Forests of Tenasserim.

2. *M. usitata*, Wall.; H. f. Ind. Fl. 25.—*Thit-say-pen*.—A tree (50—60 + 15—30 + 6—9), shedding leaves in H.S., all younger parts villous; bark thin, irregularly breaking up into small angular thin flakes; leaves oblong or obovate-cuneate, decurrent on the strong densely pubescent petiole which is often up to an inch long, blunt or acute, entire, rather chartaceous, while young on both sides densely and softly villous, when adult turning shortly and densely pubescent, 9-12 in. long, the parallel nerves and net-veination conspicuous; flowers white, middling-sized, on 4-6 lin. long tomentose pedicels, laxly cymulose, forming densely pubescent or tomentose panicles in the axils of the upper leaves and much shorter than them; calyx as in the former, 4-5 lin. long, puberulous; petals lanceolate, acute, 5 lin. long, pubescent; drupes globular, the size of a cherry, smooth, on a thick hardly 4-5 lin. long stalk; petals wing-shaped, stellately spreading, oblong, about 2 in. long, much-veined, purplish, glabrous.

HAB.—Frequent in the open forests, especially the Eng and hill Eng forests, rare in the dry forests, from Prome, Pegu, and Martaban down to Tenasserim, up to 3,000 ft. elevation; also Ava.—Fl. March; Fr. Apr.-May.—1.—SS.—Lat. Dil. Aren. Metam.

REMARKS.—Wood red-brown, close and fine-grained. □' = 54 pd. Used for stocks of Burmese anchors, tool-helvs, &c., and is recommended for handles of tools and for machinery generally, for railway-sleepers, gun-stocks, &c. The tree exudes a black gum—the famous Martaban varnish—with which almost every vessel in a Burmese house, intended to contain either solid or liquid food, is lacquered.

### PARISHIA, Hf.

Flowers dioecious. Calyx 3-4-lobed, valvate, wing-like enlarged after flowering. Petals 4, imbricate. Males: Stamens 4, inserted below the margin of the annular 4-lobed disk. Ovary rudimentary, columnar. Females: Ovary free, sessile, with a solitary pendulous ovule; style terminal, unequally 3-cleft. Fruit coriaceous, sessile, 1-seeded.—Trees, with alternate pinnate leaves. Flowers rather small, in ample panicles.

1. *P. insignis*, H. f. Ind. Fl. ii. 30.—An evergreen tree (80—100 + 30—60 + 8—12), the younger parts tawny villous; leaves unpaired-pinnate, the rachis and petiole terete and glabrous; leaflets usually in 9 pairs with an odd one, ovate-oblong to ovate, a little oblique, on a short puberulous petiolule, acuminate, 4-5 in. long, chartaceous, glabrous, the nerves thin, but conspicuous on both sides; flowers rather small, on slender 3-4 lin. long pubescent pedicels, laxly cymulose and forming an ample peduncled rusty villous panicle of about the length of the leaves; bracts linear or linear-lanceolate, tawny or rusty pubescent, 2-3 lin. long; calyx

rusty pubescent; petals about 2 lin. long; drupes coriaceous, almost globular, apiculate, the size of a cherry, densely rusty or tawny tomentose, sessile and supported by the 3 or 4 wing-shaped sepals, the latter linear-oblong, much nerved, reddish, blunt or usually notched, minutely and softly pubescent beneath, more or less glabrescent on the upper surface, 2-3 in. long.

HAB.—Frequent in the tropical forests of the Andamans; also Tenasserim.—Fr. May.—s.—SS.—SiS.

## RHUS, L.

Flowers polygamous. Calyx 4-6-parted, persistent, imbricate. Petals 4-6, imbricate. Stamens 4-6 or 10, free, inserted at the base of the annular disk; the filaments subulate, in the females castrate. Ovary sessile, with a solitary ovule suspended from a free basilar funicle; styles 3, short and long, free or connate. Drupes small, dry or sappy, containing a crustaceous or bony 1-seeded putamen.—Trees or shrubs, with alternate, pinnate or pinnately 3-foliolate (rarely simple) leaves. Flowers small, in axillary and terminal panicles.

Leaves glabrous, 3-foliolate, the leaflets entire; panicles glabrous. *R. paniculata*.

Leaves pinnate, pubescent; leaflets serrate-toothed; panicles tomentose or puberulous; endocarp smooth and bony.

*R. Javanica*.

As preceding, but petiole slender and glabrous; endocarp fibrous. *R. Khasiana*.

1. *R. paniculata*, Wall.; H.f. Ind. Fl. ii. 10.—A little leaf-shedding tree, all parts glabrous; leaves pinnately 3-foliolate, on a 1-1½ in. long petiole; leaflets obovate-oblong or cuneate-obovate, narrowed at the base, sessile or nearly so, blunt or bluntish, 2-4 in. long, entire, glabrous, chartaceous, conspicuously nerved on both sides; flowers minute, pale-green, slenderly pedicelled, cymulose, forming slender, glabrous, peduncled panicles at the end of the branches and in the axils of the leaves; petals hardly ½ lin. long, oblong, blunt; drupes obliquely oblong, compressed, the size of a lentil, smooth and glossy.

HAB.—Not uncommon in the Eng and dry forests of Prome and Ava.—Fl. Sept.; Fr. Jan.—l.—SS.—Lat. CaS.

2. *R. Javanica*, L.; Brand. For. Fl. 119 (*R. semialata*, Murr.; H.f. Ind. Fl. ii. 10).—A tree (25—30 + 8—15 + 1—2), probably leaf-shedding, all softer parts pubescent or tomentose; leaves unpaired-pinnate, on a terete pubescent petiole, the rachis more or less narrowly-bordered towards the apex; leaflets opposite, oblong, sessile, sharply but shortly acuminate, coarsely serrate-toothed, membranous, 2-3 in. long, puberulous above, softly and densely pubescent or tomentose beneath, the nerves more or less conspicuous; flowers yellowish, small, very shortly pedicelled, clustered and forming

rusty or tawny villous or pubescent terminal large panicles; petals obovate, about a line long; drupes compressed-orbicular, the size of a lentil, greenish white, somewhat clammy, and while young puberulous.

HAB.—Not unfrequent in the hill Eng forests and drier hill forests of Marlaban, at 2,000 to 4,000 ft. elevation; also Ava.—Fl. Sept.-Oct.; Fr. Apr.—1—SS.—Metam.

REMARKS.—Wood greyish white, soft and light.

3. *R. Khasiana*, H.f. Ind. Fl. ii. 10.—A large tree; leaves 1-1½ ft. long, unpaired-pinnate, the petiole terete, very slender, soft, pubescent towards the tip; leaflets in 8-12 pairs, obliquely lanceolate, almost sessile, cuneate at the base, 3-4 in. long, incised-serrate, long-acuminate, membranous, hairy chiefly on the very slender nerves beneath; flowers unknown; drupes ½ in. in diameter, in open panicles, orbicular-ovate, pedicelled, compressed, the epicarp papery, pale-coloured, irregularly torn, exposing a fibrous endocarp. —(From Hooker's Ind. Fl.)

HAB.—Chittagong.

### TAPIRIA, Juss.

Flowers polygamous. Calyx 5-parted, imbricate. Petals 5, imbricate. Stamens 10, inserted at the base of the 5-lobed rather broad disk; anthers globular. Ovary in the males immersed in the disk, 4-5-lobed with as many styles, in the females free, half-immersed, with a solitary ovule suspended from the summit of the cavity of the cell; style short, conical. Drupe fleshy, containing a crustaceous 1-seeded putamen.—Trees or shrubs, erect or scandent, with alternate pinnate leaves. Flowers minute, in axillary and terminal panicles.

1. *T. hirsuta*, Kz.; H.f. Ind. Fl. ii. 28.—A large scandent shrub all parts more or less hirsute; leaves unpaired-pinnate, shortly petioled, the rachis hirsute; leaflets usually in 6 pairs with an 1. one, ovate or ovate-oblong, very shortly petioluled, 1-2 in. long shortly acuminate, serrate, membranous, hirsute or sprinkled with short hairs, the midrib usually very hirsute; flowers minute, white on 1-1½ lin. long capillary glabrous pedicels, cymulose and form in very slender axillary and terminal hirsute panicles longer than the leaves; petals ovate, acute, about ⅔ lin. long; disk yellow, 5-lobed ovaries 5, connate, but the upper parts with the styles free, all abortive but one; drupes the size of a large pea, obliquely ob- or ovoid-kidney-shaped, fleshy, red, marked with 4 irregularly disposed tubercles (the abortive ovaries).

HAB.—Chittagong.—Fl. Febr.

## ODINA, Roxb.

Flowers polygamously dioecious; calyx 4-5-lobed, persistent, imbricate. Petals 4-5, imbricate. Disk annular, 4- or 5-crenate. Males: Stamens 8-10, inserted below the margin of the disk, the filaments nearly as long as the petals. Ovary 4- or 5-parted. Females: Ovary sessile, free, with a solitary ovule attached to near the summit of the cavity; styles 3-4, thick; drupes crowned with the persistent styles, containing a hard 1-seeded putamen.—Trees, with alternate pinnate leaves. Flowers small, clustered and forming racemes or panicles.

1. *O. Wodier*, Roxb.; H.f. Ind. Fl. ii. 29; Bedd. Sylv. Madr. t. 123; Brand. For. Fl. 123.—*Na-bai*.—A tree (30—60 + 15—40 + 3—10), remaining low and stunted in sterile localities, leafless during H.S., the very young parts and leaf-buds minutely puberulous; bark 1-2 in. thick, grey, brittle, longitudinally cracked and peeling off in irregular small rough pieces; cut purplish; leaves unpaired-pinnate, glabrous, the rachis and petiole terete; leaflets usually in 3-4 pairs with an odd one, opposite, ovate-oblong to ovate, sessile or shortly petioluled or more usually decurrent on one side only, 3-5 in. long, acuminate, entire, membranous, glabrous, or while very young minutely puberulous along the nerves beneath; flowers small, purplish green, almost sessile, clustered and forming numerous simple usually drooping racemes, the males in branched (while young more or less puberulous) panicles at the end of the leafless rather thick branches; petals oblong, about a line long, uniformly greenish or usually dull-purple on the middle; drupes oblong-kidney-shaped, the size of a small bean, smooth, red, 1-seeded.

HAB.—Frequent in all sorts of leaf-shedding forests, all over Burma from Ava and Martaban down to Tenasserim and the Andamans, up to 3,000 ft. elevation.—Fl. Feb.-March; Fr. Sept.-Oct.—1.—SS.=∞ *SiS*.

REMARKS.—Sap-wood rather light and coarse, of a white colour, turning pale-brown; heart-wood heavier, close-grained, of a reddish brown colour. □' = 65 pd. It is said to be very difficult to season. The heart-wood is used for sheaths of swords, spear-handles, oil-presses and rice-pounders. If well seasoned it is a good wood for cabinet-work. The tree yields a yellowish gum in considerable quantities, which furnishes an inferior varnish. The bark is good for tanning.

## SPONDIAS, L.

Flowers polygamous. Calyx 4-5-cleft, imbricate, deciduous. Petals 4-5, nearly valvate. Stamens 8-10, inserted under the cup-shaped rather broad crenate disk. Ovary sessile, free, 4- or 5-celled, with a solitary pendulous ovule in each cell. Drupe fleshy, large, containing a hard and bony 3-4-celled putamen. Radicle superior.

—Trees, with alternate pinnate leaves. Flowers minute, in terminal panicles.

1. *S. mangifera*, Pers.; H.f. Ind. Fl. ii. 42; Bedd. Sylv. Madr. t. 99; Brand. For. Fl. 128.—*Gway*.—A tree (90—100 + 50—60 + 10—12), leafless during the greater part of the D.S., all parts glabrous; bark an inch thick, smooth, grey, slightly cracked; leaves unpaired-pinnate, glabrous, the petiole terete; leaflets usually in 3 to 5 pairs with an odd one, oblong to oblong-lanceolate, opposite, shortly petioluled, 3-6 in. long, shortly acuminate, membranous, entire, glabrous, the parallel numerous nerves thin and faint and uniting along the margin; flowers small, whitish, almost sessile, clustered, forming a robust glabrous panicle at the end of the thick branchlets; petals oblong-lanceolate, about 2 lin. long; disk large, fleshy; stamens 10, very short; drupes drooping, elliptical or ovoid, the size of a pullet's egg, fleshy, smooth, yellow, very acerb, but edible, containing a large fibrous-woody 5-celled putamen, of which usually only 1-2 seeds come to perfection.

HAB.—Frequent in the mixed forests, especially the upper ones, all over Burma from Chittagong, Prome, and Martaban down to Tennasserim, up to 3,000 ft. elevation. Fl. March-Apr.—Fr. C.S.—1.—SiS. = ∞ SiS.

REMARKS.—Wood white, soft, coarse and useless. The tree yields large quantities of a transparent juice which soon hardens into a mild, yellowish gum, somewhat resembling gum-arabic.

## DRACONTOMELUM, Bl.

Flowers hermaphrodite. Calyx 5-parted, imbricate. Petals almost valvate. Stamens 10, inserted at the base of the disk; ovary sessile, 5-celled, with a pendulous solitary ovule in each cell; styles 5, thick, ovary-shaped. Drupes globose or spha. fleshy, the putamen bony, 2-5-celled.—Trees, with alternate pinnate leaves. Flowers small, almost clustered, in axillary or almost terminal panicles.

1. *D. mangiferum*, Bl.; H.f. Ind. Fl. ii. 43.—An evergreen tree (90—100 + 60-70 + 8—10), the shoots tawny pubescent; leaves unpaired- (rarely and only occasionally pairedly) pinnate, the petiole and almost terete rachis puberulous and short. Leaves more or less glabrescent; leaflets in about 6-9 pairs, alternate or opposite on the same leaf, on a very short pilose glabrescent petiole, ovate or elliptically oblong, rounded and more or less unequal at the base, usually shortly and sharply acuminate, chartaceous 5-6 lin. long, above (except the pubescent midrib) glabrous, beneath puberulous all over or only along the nerves and more or less glabrescent; flowers rather small, on velvety 2-3 lin. long pedicels.

racemulose, forming large axillary densely puberulous or almost velvety panicles shorter than the leaves; calyx minutely appressed puberulous, the lobes oblong, blunt; petals about 4 lin. long or longer, their tips reflexed; drupes the size of a wood-apple, somewhat depressed-globose, about 1-1½ in. in diameter, roughish or smooth, yellowish or orange-yellowish, acerb-fleshy, but edible, containing a large, much depressed, bony, irregularly and obsoletely 10-ribbed putamen.

HAB.—Frequent in the tropical and moister upper mixed forests of the Andamans.—Fr. Apr.—May.—s.—SS. = Metam.

### CONNARACEÆ.

Flowers usually hermaphrodite, regular or nearly so. Calyx 5-cleft or 5-parted, often persistent, imbricate or valvate. Petals 5, free, or sometimes slightly coherent at the middle, imbricate, rarely valvate. Stamens perigynous or hypogynous, sometimes distinctly declinate, 5 or 10, very often alternately shorter and sometimes imperfect; filaments usually united in a ring at the base; anthers usually opening inwards, didymous. Disk none, thin or incomplete. Ovary of 5 distinct one-celled carpels, either all perfect, or 1 fertile and the rest abortive, rarely reduced to 2 or 1 carpel, with 2 erect or ascending ovules in each; styles subulate or filiform. Ripe carpels usually solitary, sessile or stalked, follicle-like, usually dehiscing along the inner, rarely along the outer suture, 1- or very rarely 2-seeded. Seed with or without arillus, the testa thick, often fleshy below the middle and arillus-like. Albumen fleshy or none.—Trees or shrubs, often scandent, with alternate 1-3-foliolate or pinnate leaves. Leaves usually small, in racemes or panicles.

An order of little known value, containing only small trees and usually scandent shrubs. The *Demerara zebra-wood* is said to come from *Omphalobium Lambertii*.

\* *Sepals imbricate. Albumen none.*

Calyx enlarged in fruit; follicle sessile	:	:	:	:	<i>Rourea.</i>
Calyx unchanged or caducous; follicle stalked	:	:	:	:	<i>Connarus.</i>

\* \* *Sepals valvate.*

Carpels 5-7, sessile; leaves unpaired-pinnate; follicles pilose within	:	:	:	:	<i>Cnestis.</i>
Carpels 5, sessile; leaves unpaired-pinnate; follicles glabrous within	:	:	:	:	<i>Teniochlamis.</i>
Carpels solitary; leaves 1-foliolate; small trees	:	:	:	:	<i>Ellipanthus.</i>

### ROUREA, Aubl.

Calyx 5-parted, the lobes imbricate, hardening and enlarging. Petals 5, longer than the calyx. Stamens 10, the 5 alternating one longer; filaments filiform, united in a ring at the base. Carpel

5, 4 of them usually imperfect and style-shaped; style subulate. Follicle sessile, usually curved outwards, at the base closely surrounded with the enlarged calyx. Arillus complete or incomplete, split. Testa smooth, glossy. Albumen none.—Shrubs or little trees, sometimes scandent, with pinnate leaves. Flowers small, in axillary panicles.

\* *All parts quite glabrous. Leaflets in few (not above 6) pairs, acuminate to caudate.*

Leaflets 1½-2 in. long, the rachis and petiolules very slender . . . *R. pulchella.*  
 Leaflets 5-8 in. long, the rachis and petiole stout . . . *R. commutata.*

\*.\* *Inflorescence, leaf-rachis, and often the under-surface of the leaflets, puberulous or shortly pilose. Leaflets in numerous pairs, small, usually retuse or rounded at the apex.*

× Sepals erect and cupular-clasping.

Leaflets pubescent or pilose beneath . . . . . *R. villosa.*  
 Leaflets glabrous on both sides . . . . . *R. Wallichiana.*

× × Sepals spreading.

Leaflets obliquely ovate or obovate, 2-lobed at the summit . . . *R. stenopetala.*

1. *R. pulchella*, Planch. ; H.f. Ind. Fl. ii. 48.—A shrub (scandent ?), all parts quite glabrous; leaves unpaired-pinnate, the petiole and rachis very slender and almost filiform; leaflets in 3 or 2 pairs with an odd one, on a very slender petiolule about 2 lin. long, ovate-lanceolate or lanceolate, 1-2 in. long, bluntish caudate-acuminate, entire, firmly chartaceous, glossy, the net-veination rather lax and very prominent on both sides; flowers small, on 4-5 lin. long very slender and glabrous pedicels, by 2 or 3, or sometimes solitary, and forming very slender glabrous raceme-like panicles or almost simple racemes in the axils of the leaves and much shorter than them; calyx-lobes rotundate-ovate, blunt, minutely ciliate; petals twice as long as the sepals, oblong.

HAB.—Tenasserim.

2. *R. commutata*, Planch.; H.f. Ind. Fl. ii. 47.—A large scandent, evergreen shrub, all parts glabrous; leaves unpaired-pinnate, glabrous, the rachis and petiole strong; leaflets usually large, in 2 or 3 pairs with an odd one, or not seldom in 4-6 pairs with or without an odd one, more or less alternate, on a rather short thick petiolule, ovate to ovate-oblong, rarely oblong-lanceolate, abruptly and bluntish acuminate, entire, almost coriaceous, glossy, usually 5-8 in long, seldom smaller, glabrous, thinly and laxly net-veined; stipules stiff, subulate; flowers rather small, white, on 2 to 3 lin. long rather thick pedicels, forming sessile glabrous panicles much branched at the base, or racemes in the axils of the leaves and much shorter than them; sepals ovate-oblong, obsoletely ciliate, about a line long petals twice as long, obovate-oblong, glabrous; carpels 5, in a long recurved style, only one maturing; follicle obliquely ovate-oblong, nearly an inch long, acute, dehiscing along the inner suture.

and bending outwards, exposing the solitary seed enveloped in the orange-coloured complete arillus.

HAB.—Not unfrequent in the tropical forests from Martaban and Tenasserim down to the Andamans; also Chittagong.—Fl. May-June.

3. *R. villosa*, Planch.; H.f. Ind. Fl. ii. 48.—A scandent shrub, the branchlets and younger parts shortly tawny tomentose; leaves pinnate, the rachis and petiole shortly and densely tomentose; leaflets small, in numerous pairs with or without an odd one, somewhat rhomboid-oblong or oblong, blunt, sessile, rounded at the base, 5-10 lin. long, coriaceous, entire, glossy and glabrous above, beneath sparingly pilose and, excepting the midrib, glabrescent; flowers small, on 1-2 lin. long hairy pedicels, forming 2-3 simple or compound densely villous or pilose racemes in the axils of the leaves and shorter than them; calyx-lobes oblong, nearly a line long, shortly pilose outside; petals linear-oblong, nearly 3 times longer than the calyx; foliicles oblong, glabrous, acute, about  $\frac{1}{2}$  an in. long, opening along the inner edge and exposing the single oblong seed enclosed in the complete arillus.

HAB.—Tenasserim.—Fl. March.

4. *R. Wallichiana*, Planch.; H.f. Ind. Fl. ii. 49.—Leaves 6-10 in. long, the petiole pubescent; leaflets in 15-30 pairs, linear-oblong, rounded or almost cordate at the base,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, always blunt, dark-brown in drying, glabrous, above hardly shining, beneath opaque, the nerves faint; flowers  $\frac{1}{2}$  in. in diameter, on very slender pedicels exceeding or equalling the orbicular, ciliate sepals, forming slender, villous racemes panicle at the base and much shorter than the leaves; petals  $\frac{1}{4}$  in. long, linear, glabrous; foliicle  $\frac{1}{2}$ - $\frac{2}{3}$  in. long, curved.—(From Hooker's Ind. Fl.)

HAB.—Tenasserim, from Moulmein southwards.

5. *R. stenopetala*, H.f. Ind. Fl. ii. 49.—A scandent shrub, the branchlets pubescent; leaves 2-4 lin. long, the petiole slender and pubescent; leaflets in 6-10 pairs, obliquely ovate or obovate, 2-lobed at the apex, contracted cordate and very oblique at the base,  $\frac{3}{4}$ -1 in. long, shining on both sides, the midrib beneath pubescent, the nerves and net-veination obscure; racemes apparently almost reduced to fascicles; bracts ovate, ferruginous; pedicels slender; sepals lanceolate, acute, spreading, imbricate, pubescent at the tip; petals linear, very narrow,  $2\frac{1}{2}$  times longer than the sepals; stamens 10, alternately shorter and monadelphous at the very base; ovaries 5, free, pilose; styles filiform, almost glabrous, terminated by a capitate stigma.

HAB.—Southern Tenasserim.—Fl. Jan.

## CONNARUS, L.

Calyx 5-parted, the lobes not enlarging, imbricate, persistent or deciduous. Petals 5, longer than the calyx, sometimes slightly cohering. Stamens 10, alternately shorter and sometimes castrate; filaments filiform, united in a ring at the base. Disk none or thin and annular. Carpels 5, 4 of which usually minute or quite suppressed; style subulate. Follicle stalked, coriaceous, opening along the inner suture, one-seeded. Arillus incomplete, lobed and adnate to the broad hilum. Testa glossy. Albumen none.—Little trees or shrubs, usually scandent, with alternate pinnate or rarely pinnately 3-foliolate leaves, the leaflets in few pairs. Flowers small, in axillary panicles or rarely racemes.

\* *Follicles tomentose outside.*

Rachis of leaves and leaflets beneath pubescent; follicles tomentose

*C. semidecandrus.*

\* \* *Follicles more or less pubescent or velvety within, glabrous or nearly so outside.*

× Petioles and leaflets beneath pubescent, the nervation very indistinct

*C. Griffithii.*

× × Leaflets perfectly glabrous; follicles stalked.

+ Follicles chartaceous or thin coriaceous, deeply striate.

A large tree; follicles about an inch long or longer

*C. paniculatus.*

Climber; follicles about  $\frac{1}{2}$  in. long or somewhat longer

*C. gibbosus.*

Apparently like preceding, but the follicles nearly cylindrical

*C. latifolius.*

+ + Follicles woody.

Leaflets thick, coriaceous, large; follicles about 2 in. long

*C. grandis.*

1. *C. semidecandrus*, Jack.; H.f. Ind. Fl. ii. 52.—A small tree, the young shoots softly rusty villous; leaves unpaired-pinnate; leaflets in 1-2 pairs with an odd one, ovate-lanceolate to broadly lanceolate, acuminate, entire, smooth above, slightly villous beneath, 3-4 in. long, the nerves lucid; flowers light-bluish, in brownish villous panicles at the end of the branchlets and in the axils of the upper leaves; bracts small; sepals erect, tomentose, reddish; petals longer than the sepals; stamens 10, 5 of them exerted and fertile, the other 5 short and sterile, all united into a ring at the base; follicle tomentose, rusty-coloured, 2-valved, 1-seeded, the seed caruncled.—(From Jack's Mal. Misc.)

HAB.—Southern Tenasserim (according to Hooker).

2. *C. Griffithii*, H.f. Ind. Fl. ii. 52.—Branches slender, pubescent; petiole pubescent; leaflets ovate- or elliptically lanceolate, 3-5 in. long, acuminate, thinly coriaceous, beneath finely pubescent with rusty hairs, the midrib distinct, the nerves very faint, oblique; flowers  $\frac{1}{2}$  in. long, in rusty pubescent panicles; sepals linear-oblong; petals more than twice as long, glabrous, ligulate; filaments almost glabrous.—(From Hooker's Ind. Fl.)

HAB.—Southern Tenasserim.

3. *C. paniculatus*, Roxb.—A large timber tree, the young shoots clothed with a little rusty down; leaves unpaired-pinnate, about a foot long, the petiole smooth; leaflets in 2 or 3, rarely in a single pair, with an odd one, almost opposite, ovate-oblong, bluntish acuminate, 3-6 in. long, smooth and glossy; flowers decandrous, in large spreading rusty pubescent panicles at the end of the branchlets and in the axils of the upper leaves; bracts small, caducous, villous; sepals oblong, concave; petals somewhat longer than the sepals, linear-lanceolate (without bristles at the base); filaments alternately longer, united at the base; carpels and the long style hairy, the stigma somewhat capitate.—(From Roxburgh.)

HAB.—Chittagong.—Fl. June.

4. *C. gibbosus*, Wall.; H.f. Ind. Fl. ii. 52.—A large half-scandent shrub, the young shoots rusty puberulous; leaves unpaired-pinnate, the rachis and petiole glabrous; leaflets in 2 or a single pair with an odd one, opposite and alternate, oblong to oblong-lanceolate and ovate-oblong, on a short and thick petiolule, rounded or obtuse at the base, 4-5 in. long, bluntish acuminate, entire, rather coriaceous, glabrous, more or less glossy above; flowers small, white, on very short thick densely rusty-puberulous pedicels, cymulose and forming large terminal and axillary rusty-tomentose or densely puberulous panicles usually longer than the leaves; calyx brown, densely rusty-puberulous, the lobes linear-oblong, acute,  $1\frac{1}{2}$  lin. long; petals in opening ovate-oblong, lengthening and becoming linear, 2-3 times as long as the calyx, slightly puberulous or glabrous, villously-ciliate; filaments very long and slender, glabrous; ovary densely rusty-villous; follicles ovoid-oblong and somewhat compressed, narrowed in a thick stalk, more or less transversely nerved-striated, about an inch long, slightly rusty-puberulous, but soon glabrescent; seed oblong, glossy black, the arillus lobed, not half so long.

HAB.—Common in the tropical and hill forests, entering also the poonzohs, from Chittagong, the southern slopes of the Pegu Yomah and Martaban down to Tenasserim and the Andamans, up to 3,000 ft. elevation.—Fl. Apr.-May; Fr. May-June—l. x s.—SS. = *Metam.* Dil.

5. *C. latifolius*, Wall.; H.f. Ind. Fl. ii. 53.—Leaflets elliptically oblong with contracted, blunt or notched points, 4-7 in long, coriaceous, quite glabrous, the nerves in 5 pairs, slender, arched, the net-veination indistinct; flowers  $\frac{1}{6}$  in. long, in widely spreading panicles; follicles  $\frac{3}{4}$  in. long by  $\frac{1}{2}$  broad, shortly sub-cylindrical, with very round tops, and an obscure sub-lateral point, abruptly contracted into the stalk, very turgid, finely puberulous within.—(From Hooker's Ind. Fl.)

HAB.—Tenasserim, from Moulmein southwards.

6. *C. grandis*, Jack; H.f. Ind. Fl. ii. 53.—A moderately sized tree, all parts glabrous; leaves unpaired-pinnate, the petiole stout; leaflets in 1 or 2 pairs with an odd one, very large (8-14 in long), ovate-lanceolate to elliptically oblong, on short stout petioles, bluntish acuminate or blunt, thick coriaceous, polished, the transverse nerves distinct beneath; flowers  $\frac{1}{2}$  in. long, in spreading greyish puberulous panicles; sepals linear-oblong, blunt; petals twice as long, linear, dilated upwards, almost glabrous; filaments puberulous, the alternate ones 3 times longer; follicles oblique, contracted into the stalk, rounded at the sutures, about 2 in. long,  $\frac{3}{4}$ -1 broad, turgid, woody, glabrous, coarsely striate (smooth, according to Jack), red.

HAB.—Tenasserim or Andaman Islands (according to Hooker).

### CNESTIS, Juss.

Flowers polygamously dioecious. Calyx 5-parted, the upper 3 valvate, persistent and spreading under the fruit. Petals 5, shorter than the calyx. Stamens 10, almost equal; filaments filiform free. Carpels 5, sessile, the styles short. Follicles 1 or 2, coriaceous. Arillus none. Albumen fleshy.—Little trees or usually scandent shrubs, with pinnate leaves, the leaflets in numerous pairs. Flowers solitary or clustered, in small racemes or rarely in panicles axillary or from the branches.

Scandent shrub; sepals a line long; leaflets usually opposite . . . *C. platantha*.

Erect small tree or shrub; sepals 2 lin. long; flowers long-pedicelled;

leaflets often alternate . . . *C. ramiflora*.

1. *C. platantha*, Griff.—*Taw-kyet-louk* or *kyet-mouk-nee*.—A large scandent shrub, in dry situations remaining low; all softer parts tomentose or pubescent; leaves unpaired-pinnate, the rachis and petiole tomentose; leaflets in numerous pairs with an odd one, opposite or nearly so, oblong or nearly so, often a little rhomboid, on a very short thick tomentose petiole or almost sessile, varying in size from 1 to 3 in. long, blunt or shortly and bluntish acuminate, rounded or almost cordate at the usually somewhat oblique base, entire, when adult almost coriaceous, above glabrescent, beneath softly pubescent; flowers small, yellowish, scented, on very short pubescent pedicels or almost sessile, forming numerous tawny tomentose, slender, simple or slightly branched racemes usually arising from above the scars of the fallen leaves or in the axils of the leaves themselves and much shorter than them; sepals linear-oblong, pubescent, slightly imbricate at the base or almost valvate, about a lin. long; petals 5, occasionally 6, linear-oblong, blunt or notched, as long as the sepals, glabrous; carpels 5-7, tomentose; follicles oblong-lanceolate, often paired, sessile, bluntish acuminate,

velvety-tomentose outside and bright red, densely tawny setose within, thick and fleshy coriaceous, acid and edible.

HAB.—Frequent all over Burma in the tropical and low forests from Pegu and Martaban down to Tenasserim and the Andamans.—Fl. R. S.; Fr. Apr.-May.—s: 1.—SS.=petrophilous, *Metam. Lat. p.*

REMARKS.—Wood soft and white.

2. *C. ramiflora*, Griff.—Very like the preceding, but an erect shrub or small tree and the leaflets much alternate and usually more acute; flowers larger, on longer pedicels; sepals about 2 lin. long; rest as in preceding species.

HAB.—Tenasserim.

## ELLIPANTHUS, Hf.

Calyx 5-parted, not enlarging, nearly erect, valvate. Petals 5, longer than the calyx, imbricate. Stamens 10, the alternating 5 without anthers; filaments short, subulate, united in a tube at the base. Carpel solitary, dehiscing along the outer suture, tapering in a short style. Follicle stalked, coriaceous, glabrous within. Arillus basilar. Albumen none.—Small trees or shrubs, with 1-foliolate leaves. Flowers small, in axillary short racemes.

× Both surfaces of leaf glabrous.

Leaves and petiole glabrous . . . . . *E. calophyllus*.

Midrib beneath and petiole puberulous . . . . . *E. Helferi*.

× × Leaves pubescent or puberulous beneath . . . . . *E. tomentosus*.

1. *E. calophyllus*, Kz.; H.f. Ind. Fl. ii. 55.—A little evergreen tree, 15 to 25 ft. high, with a girth of 2-3 ft., the leaf-buds tawny pubescent; leaves 1-foliolate, ovate-oblong to oblong, on a glabrous petiole an inch long or longer, bluntish acuminate, 5-6 in. long, almost coriaceous, entire, glabrous, copiously and elegantly net-veined on both sides, the nerves beneath reddish; flowers rather small, on straight rather short densely puberulous pedicels, forming short densely puberulous axillary racemes hardly an inch long; petals linear-oblong, densely velvety, about 3 lin. long; follicles obliquely oblong, tapering in a short and thick stalk, compressed, apiculate, about an inch long, coriaceous, velvety-tomentose, glabrous within.

HAB.—Frequent in the tropical forests of the Andamans.—Fl. May; Fr. June-July.—s.—SS.=Metam.

2. *E. Helferi*, H.f. Ind. Fl. ii. 55.—A tree or shrub (?), the younger parts all densely puberulous; leaves 1-foliolate, ovate-lanceolate to lanceolate and linear-lanceolate, on a 6-8 lin. long densely puberulous petiole, acuminate, obtuse at the base, 4-7 in. long, entire, chartaceous, laxly and thinly net-veined, the midrib beneath puberulous; flowers forming very short puberulous axillary

racemes or rather fascicles; expanded flowers and fruits not the buds  $\frac{1}{2}$  in. long.

HAB.—Tenasserim or Andamans.

3. *E. tomentosus*, Kz.; H.f. Ind. Fl. ii. 56.—A small evergreen tree, the younger parts all densely tawny tomentose; leaves 1-f. late, oblong to oblong-lanceolate and lanceolate, on a densely pubescent petiole about  $\frac{1}{2}$  in. long, short and bluntish a-c. 4-6 in. long, entire, coriaceous, elegantly net-veined on both sides above glabrous and glossy, beneath more or less tawny or yellow tomentose or pubescent, sometimes almost glabrescent; flowers rather small, on very short thick pedicels, forming short tomentose axillary branched racemes or small panicles; petals oblong, about 2 lin. long, densely tomentose; follicles obliquely oblong apiculate, somewhat compressed, about 2 in. long, tapering in rather short and thick stalk, velvety tomentose; seed large, glossy black.

HAB.—In the tropical forests of the southern slopes of the Pegu Y. and Tenasserim.—Fl. Jan.; Fr. March-Apr.—s.

## LEGUMINOSÆ.

Flowers hermaphrodite, irregular or regular. Calyx various, numerous, regular or irregular, imbricate or valvate, rarely the sepals free. Corolla of 5 or rarely fewer petals, or wanting altogether, perigynous or rarely hypogynous, irregular and more or less 1-f. flower-shaped or regular, the lobes or petals imbricate or valvate. Stamens 10, rarely fewer or indefinite, united in 1 or 2 sheaths free. Ovary of a single excentric carpel with 1 or more ovules at the ventral suture; style simple. Fruit a pod opening along or at both sutures or indehiscent, from chartaceous to fleshy and woody. Arillus more or less developed or wanting. Cotyledons large, radicle short. Albumen none or scanty, very rarely copious.—T. shrubs, or herbs, sometimes climbing, with alternate or very rarely opposite, compound or simple leaves. Stipules and stipulets usually present. Flowers various, solitary or variously arranged in axillary or terminal inflorescences.

One of the largest orders and second only to *Compositæ*, Burma represented by about 350 members and the richest species. The petals in *Papilionaceæ* are called differently from those in most other orders, *viz.*, the upper petal is called the *standard*, the lateral ones go by the name of *wings*, while the 2 lowermost form the *keel* or *keel-petals*.

To the forester the family is of great importance, and many the excellent timbers, like black- or rose-wood, sandal-wood, sissoo

iron-wood, sha, &c., &c., are the produce of leguminose trees. The zebra-wood of Rio Janeiro comes from *Centrolobium robustum*. The seeds of many herbaceous species are common articles of food, under the name of pulses, such like peas, beans, pigeons' beans, lentils, &c. Indigo, sappan-wood, log-wood, Pernambuco wood, and many other dyes belong here. The fibre of *Crotalaria juncea* furnishes the sūn or Bengal hemp of commerce, while the liber of some *Baukinias* yields also inferior cordage. The bark of others, especially *Mimoseæ*, are good for tanning purposes. Gums and resins, such as gum kino, American gum-anime, and African copal, gum dracon, balsam of copaiva, gum-arabic, &c., are all produced from trees of this order. The seeds of several species, like *Pongamia*, yield good oil, while the fruits of others like *Cynometra*, tamarind, carob, &c., are edible. Medicinal properties of various nature, but too numerous for enumeration, are met with amongst these leguminose plants, and the senna is of commercial importance.

SUB-ORD. I. *Leguminosæ proper*.—*Flowers more or less irregular. Petals imbricate.*

\* *Upper petal (standard) always outside in bud. Stamens united in 1 or 2 sheaths, with or without a more or less free vexillar one, rarely free.*

× *Stamens 10, all free or nearly so. Leaves pinnate.*

Pods thick, fleshy coriaceous, dehiscent; arillus complete; stipules and stipulets present . . . . . *Arillaria.*

Pods moniliform, terete or winged, indehiscent or nearly so; arillus none; stipules, but no stipulets . . . . . *Sophora.*

× × *Stamens united in 1 or 2 sheaths, with or without a vexillary free one.*

† *Pods continuous, not articulate.*

○ *Pod indehiscent, usually large. Leaves pinnate.*

† *Pod not winged.*

Pod short and thick; leaflets opposite . . . . . *Pongamia.*

Pod reniform or moniliform, coriaceous or drupaceous; leaflets alternato . . . . . *Drepanocarpus.*

† † *Pods winged one way or other, flat.*

Leaflets opposite; pods narrowly winged along the upper or both sutures . . . . . *Derris.*

Leaflets alternate; pods oblong or linear, usually several-seeded, broadly winged all round; anthers basifix . . . . . *Dalbergia.*

Leaflets alternate; pods irregularly orbicular and broadly winged all round, the solitary seed central; anthers versatile . . . . . *Pterocarpus.*

○ ○ *Pods dehiscent (very rarely indehiscent, and in this case the leaves not pinnate).*

† *Leaves pinnate (rarely reduced to 3 or 1 leaflet).*

Upper stamen usually free, the others united in a sheath, or very rarely all united.

△ *Pods not chambered inside.*

Anthers not terminated with a gland; pods often more or less woody; disk cup-shaped or angular . . . . . *Millettia.*

△ △ *Pods chambered inside.*

Anthers terminated by a gland; leaves from pinnate to pinnately 3-1-foliate . . . . . *Indigofera.*

Anthers blunt, without gland; leaves pinnate . . . . . *Sesbania.*

- † † Leaves simple or digitately compound or pinnately 3-1 foliolate. Upper stamen usually free, at least at the base.
- △ Leaves simple or digitately 3-foliolate.
- Pods inflated . . . . . *Crotalaria*.
- Pods flat-compressed . . . . . *Priotropis*.
- △ △ Leaves pinnately 3-1-foliolate.
- † Pods indehiscent, bearing the seed at the upper end, the lower wing-like expanded and sterile . . . *Butea*.
- † † Pods dehiscent.
- § Erect trees or shrubs.
- Prickly armed; leaves not resinous-gland-dotted, 3-foliolate . . . *Erythrina*.
- Unarmed; leaves more or less gland-dotted, 3-1-foliolate; pods 1-2-seeded, inflated . . . *Flemingia*.
- Unarmed; leaves beneath resinous-gland-dotted, 3-foliolate; pods several-seeded, torose . . . *Cajanus*.
- § § Climbers or twiners.
- Calyx after flowering enlarging and scarious; leaves resinous-dotted . . . *Cylista*.
- Calyx unchanged; leaves not resinous-dotted.
- || Flowers from knots (reduced ramifications) along rachis.
- Standard shorter than the wings; bracts often large, but deciduous . . . *Mucuna*.
- Standard much longer than the wings. Bracts persistent . . . *Dioeclea*.
- As former, but bracts deciduous and small; the endocarp separating and enclosing the seeds . . . *Canavalia*.
- || || Rachis of inflorescence not thickened at the insertion of the flowers; calyx-tubo cylindrical, longer than the lobes; bracts persistent . . . *Oltoria*.
- † † Pods articulate, the articles dehiscent or indehiscent.
- Abnormal genus; pods small, 1-seeded, indehiscent . . . *Lespedeza*.
- Pods 2- many-seeded; leaves pinnately 1-3-foliolate; leaflets stipellate . . . *Desmodium*.
- Pods 2- many-seeded, moniliform; leaves pinnate; stipulets none . . . *Ormocarpum*.
- \* \* Upper petals (standard) always inside, or sometimes the petals wanting or reduced in number.
- × Petals all developed, but unequal. Seeds with albumen.
- Anthers usually basifix, opening by pores.
- Leaves abruptly pinnate; pods dehiscent or indehiscent, chambered inside . . . *Cassia*.
- ○ Anthers versatile, opening by longitudinal slits.
- † Leaves simple or 2-lobed, rarely 2-foliolate.
- Calyx spathaceous or valvately-sepalled . . . *Bauhinia*.
- † † Leaves bipinnate. Sepals more or less valvate.
- Spiny armed; pods chartaceous, torose or almost moniliform, indehiscent . . . *Parkinsonia*.
- Unarmed; pods rigidly coriaceous, flat, dehiscent . . . *Poinciana*.
- × × Albumen none.
- Leaves usually bipinnate. Sepals more or less imbricate. Petals 5, all developed. Anthers versatile.
- † Pods not winged.
- Pods compressed, coriaceous or thick, dehiscent or not . . . *Casalpinia*.
- † † Pods winged or wing-like extended, indehiscent.
- † Calyx much imbricated.

- Stigma peltate; pod flat, both margins wing-like extended;  
trees . . . . . *Peltophorum.*  
Pods samaroid with basal seed; prickly climbers . . . . . *Pterolobium.*  
Stigma minute; pod flat, thin, the upper margin winged;  
climbers . . . . . *Mesoneurum.*  
+ + Calyx almost valvate.  
Trees; pod winged only along the upper suture . . . . . *Acrocarpus.*  
○ ○ Leaves usually abruptly, very rarely unpaired-  
pinnate or 1-foliolate. Sepals imbricate or  
valvate. Petals 5 or fewer or none. Anthers  
versatile.  
+ Pods dry, coriaceous or crustaceous.  
+ Bractlets persistent, enclosing the flower-bud.  
△ Seeds without arillus.  
Petals 5, the lower 2 minute or rudimentary; stamens 10, con-  
nate, the 10th free; leaves unpaired-pinnate : . . . . . *Amherstia.*  
Petals 1 only, the others suppressed; sepals 4; leaflets in 1 or  
several pairs . . . . . *Macrobium.*  
△ △ Seeds arillate.  
Sepals and pod echinate; calyx valvate or nearly so . . . . . *Sindora.*  
Sepals and pod smooth; calyx-segments imbricate . . . . . *Pakudia.*  
+ + Bractlets minute or very caducous.  
Sepals 4; perfect petals 3, rudimentary ones 2; stamens mona-  
delphous, 3 of them perfect; pods thick, indehiscent, with  
pulpy acid mesocarp . . . . . *Tamarindus.*  
Sepals 4; petals none; stamens 3-9; leaves abruptly pinnate . . . . . *Saraca.*  
+ + Pods fleshy or fleshy coriaceous.  
Sepals 4-5; petals 5; stamens 10 or more; leaflets in 1 or  
several pairs . . . . . *Cynometra.*

SUB-ORD. II. MIMOSÆ.—*Flowers regular. Sepals and petals  
valvate and often united. Stamens definite or very numerous.*

\* *Stamens definite (5 or 10).*

○ Flowers in spikes or racemes; stamens 10; petals free  
or connate.

Flowers sessile; pods often very large, woody with thick sutures,  
the valves transversely articulate within the sutures . . . . . *Entada.*

Flowers shortly pedicelled; pods thin coriaceous, turgid, inside  
transversely septate between the seeds, dehiscing . . . . . *Adenantha.*

○ ○ Flowers in globose or pear-shaped heads.

Flower-heads large, the lower flowers nenter with 10 long mona-  
delphous staminodes; pods coriaceous, indehiscent . . . . . *Parkia.*

Flower-heads small; pods woody, elastically dehiscing . . . . . *Xylia.*

\* \* *Stamens indefinite, usually very numerous.*

+ Seeds not arillate.

Stamens free or rarely united at the base only; pods various . . . . . *Acacia.*

Stamens united in a tube; pods straight . . . . . *Albizia.*

As preceding, but pods serow-like twisted . . . . . *Pithecolobium.*

+ + Seeds arillate.

Stamens united in a tube . . . . . *Inga.*

SUB-ORD. I. LEGUMINOSÆ PROPER.—*Flowers more or less irregular  
and often papilionaceous. Petals imbricate.*

\* *Standard always outside in bud.*

## ARILLARIA, Kz.

Calyx wide, the 2 upper teeth somewhat larger. Standard almost orbicular; wings and keel almost conform, securiform-falcate; all petals free and shortly clawed. Stamens 10, all free and fertile, unequal, the anthers versatile. Ovary shortly and thick-stalked, with 2 ovules; style filiform, revolute, the stigma lateral. Pod oblong, terete, fleshy coriaceous, dehiscing along both sutures. Seeds 1 or 2, large, perfectly enveloped by the scarlet arillus.—Trees, with unpaired-pinnate leaves, the leaflets opposite, stipellate. Flowers racemose, in terminal panicles.

1. *A. robusta*, Kz.—*Kway-tanying*.—An evergreen tree (40—50+15—25+4—5), the young shoots tawny velvety tomentose; bark longitudinally and obsoletely fissured, dark, rough, like that of *Erythrina Indica*; leaves unpaired-pinnate, 1-1½ ft. long, the rachis tawny pubescent; stipules persistent, linear-subulate, about 2 lin. long, pubescent; leaflets in 4 or 5 pairs, oblong, on a strong 2 lin. long pubescent petiolule, acute or apiculate, 3-4 in. long, entire, thin coriaceous, above glabrous when full grown, beneath minutely tawny pubescent; flowers rather large, dull-white, on short thick tomentose pedicels, racemose and collected into robust, rusty or tawny tomentose, terminal panicles; bracts persistent, linear, 2-3 lin. long, tomentose; calyx wide, nearly 3 lin. deep, densely tomentose; corolla glabrous, about 3 lin. long; ovary villous; pods oblong or elliptically oblong, at the base contracted in a short thick pubescent stalk, acute, fleshy-leathery, leather-yellow, slightly pubescent or almost glabrous, containing a single or rarely 2 large glossy black seeds enveloped in a scarlet or blood-red fleshy arillus.

HAB.—Not unfrequent in the tropical forests of the southern spurs of Pegu Yomah and in Upper Tenasserim.—Fl. Apr.; Fr. June.—s.—SS.—Lat.

## SOPHORA, L.

Calyx-teeth very short. Standard broad, erect or reflex wings oblong, erect, free; keel-petals like the wings or rather longer, scarcely united. Stamens 10, free, or 9 of them slightly connate in a ring at the base; anthers all conform. Ovary short-stalked, with several ovules; style incurved, with a minute terminal stigma. Pods moniliform, fleshy coriaceous or woody, dehiscent or finally dehiscing in 2 valves, each seed enclosed in a septate partition.—Shrubs or trees, with unpaired-pinnate leaves, stipulets wanting or minute and setaceous. Flowers rather racemose, in simple racemes or racemose panicles. Bracts small, deciduous; bractlets usually none.

1. *S. tomentosa*, L.; Bedd. Sylv. Madr. 89.—*Thin-bo-ma-jee*.—An evergreen treelet (15—20 + 6—10 + 1—1½), often remaining shrubby, all parts softly and shortly tomentose; leaves unpaired-pinnate, ½-1 ft. long, the rachis pubescent; leaflets in 5-8 pairs with an odd one, very shortly petioluled, elliptical to oval, very blunt, 1-1½ in. long, thin coriaceous, entire, glabrous above, shortly and softly pubescent beneath; flowers middling-sized, yellow, on 2-3 lin. long tomentose pedicels, forming a velvety-tomentose terminal raceme; calyx obliquely truncate, obsoletely toothed, about 3 lin. wide, tomentose; corolla glabrous, about ½ in. long or somewhat longer; pods moniliform, 2-3 in. long, shortly stalked, acuminate, velvety tomentose.

HAB.—Not unfrequent in the forests of the coasts of the Andamans; also Pegu.—s.—SS. = SiS.

### PONGAMIA, Vent.

Calyx truncate. Standard orbicular, with inflexed basilar auricles; keel slightly incurved, blunt. Stamens 10, the vexillar one free at the base and united from the middle with the others in a tube; anthers uniform. Ovary nearly sessile, with 2 ovules; style incurved; stigma small, terminal. Pod broadly and obliquely oblong or slightly falcate, thick, but flat, 1-seeded, indehiscent, the sutures blunt without wings. Seeds kidney-shaped.—Trees, with unpaired-pinnate leaves, the leaflets opposite, without stipulets. Flowers in axillary racemes. Bracts very deciduous, bractlets minute or none.

1. *P. glabra*, Vent.; H.f. Ind. Fl. ii. 240; Bedd. Sylv. Madr. t. 177; Brand. For. Fl. 153.—*Theng-weng* or *Thin-win*.—A leaf-shedding tree (40—50 + 10—15 + 3—6), all parts glabrous, or the very young shoots sparingly appressed silk-hairy; leaves ½-1 ft. long, unpaired-pinnate, glabrous; leaflets in 2-4 pairs, from ovate and broadly elliptical to elliptically-oblong, on a 2-3 lin. long petiolule, shortly and bluntish acuminate, 1½-4 in. long, entire, membranous; flowers middling-sized, pale purple with white standard, on minutely puberulous or glabrous 2-3 lin. long pedicels, forming a glabrous or almost glabrous rather short raceme in the axils of the leaves; calyx wide, about 1½ lin. deep, minutely puberulous; corolla glabrous, nearly ½ an in. long; ovary pubescent; pods obliquely elliptically-oblong, at the base narrowed in a very short thick stalk, mucronate-acute, 1½ to 2 in. long, very thick and coriaceous, glabrous, obsoletely rimose-veined, 1- rarely 2-seeded.

HAB.—Common in the tidal and beach forests all along the coasts, from Chittagong down to Tenasserim and the Andamans.—Fl. Feb.-March; Fr. R.S.—I.—SS. = All. Aren.

REMARKS.—Wood white, turning yellowish, light, coarse-fibrous. Seeds yield a clear lamp-oil, known under the name of karanj oil.

## DREPANOCARPUS, C. Mey.

Calyx bell-shaped, the teeth shorter or longer. Standard broadly ovate or orbicular, without appendages, glabrous or silky-hairy; wings oblong, often falcate; keel incurved, on the back united with the petals or free. Stamens united in a single slit sheath with the vexillar one free or not, or forming 2 separate sheaths; anthers versatile. Ovary shortly stalked, with 1-3 ovules; style incurved, filiform; stigma small, terminal. Pods broadly falcate to reniform and lunate, flat or somewhat convex, thick coriaceous to almost fleshy, indehiscent, 1-3-seeded, entire or more or less moniliform contracted between the seeds. Seeds more or less compressed.—Trees or shrubs, erect or scandent, with unpaired-pinnate leaves, the leaflets usually alternate without stipulets. Stipules sometimes spiny-indurating. Flowers in axillary or terminal racemes or panicles. Bracts small, deciduous; bractlets sometimes persistent.

\* *Corolla pubescent outside or glabrous. Stamens united into a single sheath. Pods usually 1-seeded.*

Leaflets  $\frac{1}{2}$  in. long; calyx a line long . . . . . *D. spinosus*.

Leaflets about an inch long; calyx  $1\frac{1}{2}$  lin. long . . . . . *D. monospermus*.

\*\* *Corolla glabrous. Stamens united into 2 separate sheaths. Pods 1-3-seeded, moniliform-constricted between the seeds (if more than one seed).*

Climber; panicle almost glabrous; pods thick coriaceous . . . . . *D. Cumingii*.

Tree; panicle rusty-villous; fully ripe pods thick and fleshy-coriaceous . . . . . *D. reniformis*.

1. *D. Cumingii*, Kz. (*Dalbergia Cumingii*, Bth.).—A tree-like scandent shrub, all parts glabrous or the young shoots minute, puberulous; leaves unpaired-pinnate, 3-5 in. long, the rachis glabrous or while young puberulous; leaflets alternate, in 3-4 (rarely 1<sup>o</sup>) pairs, from oboval to elliptical and oblong, on a slender 1-2 li. long petiolule, blunt or bluntish apiculate or rarely notched, 1 in. long, chartaceous, entire, glabrous or minutely puberulous beneath, very glossy above; flowers very shortly pedicelled, forming a dichotomously branched peduncled puberulous or glabrous terminal and axillary panicle shorter than the leaves; calyx deeply lobed, glabrous; pods almost sessile, coriaceous, rather flat or slightly lacunose, without wings,  $\frac{1}{2}$ -3 in. long, 1-3-seeded and contracted between the seeds, glabrous, obversely oval and with a short point, or, if 1-seeded, obversely oval.

\* HAB.—Tenasserim.

REMARKS.—Is a dye-wood and furnishes the Kayu lakka of commerce.

2. *D. reniformis*, Kz. (*Dalbergia reniformis*, Roxb.;

Ind. Fl. ii. 238).—*Hlouk-ma*.—A tree (30—40 + 8—15 + 3—4), shedding leaves in H.S., in the young shoots rusty or tawny pilose and glabrescent; bark about 1-2 lin. thick, blackish, rather even, peeling off in small flakes intermixed with little warts; leaves unpaired-pinnate, fugaceously pilose while young; leaflets alternate, in 3-5 pairs, from ovate-oblong to ovate, bluntish or bluntish apiculate with a mucro, 2-3 in. long, entire, chartaceous, glabrous; flowers small, white, very shortly pedicelled, forming dichotomously branched peduncled rusty or tawny villous or tomentose panicles in the axils of the young leaves or along the leafless branchlets; calyx rusty villous, about  $1\frac{1}{2}$  lin. deep, the teeth acute; corolla glabrous,  $2\frac{1}{2}$  to nearly 3 lin. long; stamens in 2 separate sheaths; ovary villous; pods consisting of 1 or 2 unequally reniform-obovate joints, while unripe flat, but finally drupe-like thickened, fleshy, 3-4 lin. thick and minutely warted or torulose, at the base tapering in a short stalk, at the apex laterally pointed,  $1-1\frac{1}{2}$  in. long.

HAB.—Common in the swamp forests of Pegu and Martaban down to Upper Tenasserim.—Fl. Febr.-March; Fr. Apr.-June.—s.—SS.=*AH*. Metam.

REMARKS.—Wood white, turning yellow, coarsely fibrous, light, very perishable.

3. *D. spinosus* (*Dalbergia spinosa*, Roxb.; H.f. Ind. Fl. ii. 238).—*Yay-chin-ya*.—A large shrub with a tendency to climb, the branches usually armed with long straight or hook-like twisted often spiny sterile branchlets, all parts glabrous; leaves unpaired-pinnate, 1-2 in. long, the rachis filiform; leaflets in 3-5 pairs, alternate, obversely oval, blunt or notched, on a slender  $\frac{1}{2}$  a lin. long petiolule, about  $\frac{1}{2}$  in. long, entire, membranous, glabrous, glaucous-green, turning brownish in drying; flowers small, white, with a yellowish standard, on capillary about  $\frac{1}{2}$ -1 lin. long pedicels, forming a simple or branched axillary raceme shorter than the leaves, the rachis filiform; calyx about a line deep, glabrous, the teeth long, blunt, the lowermost more than doubly longer than the others; corolla glabrous, about  $1\frac{1}{2}$  lin. long, the petals shortly clawed; stamens 10, in a single slit sheath; anthers 4-celled, the cells globular; ovary glabrous; pod compressed, reniform,  $\frac{3}{4}$ -1 in. long, blunt with a mucro, at the base contracted in a 3 lin. long slender stalk, almost smooth and glabrous, coriaceous, 1-seeded.

HAB.—Frequent in the tidal forests along the coast from Chittagong down to Tenasserim.—Fl. May-June; Fr. close of rains.—s.—SS.=*Sal*.

REMARKS.—Wood soft, beautifully silvery white, close- and straight-grained. The roots powdered absorb alcohol, and a spoonful of the powder in a tumblerful of water is said to be sufficient to destroy in less than half an hour the effects of alcohol even in cases bordering on delirium tremens.

4. *D. monospermus* (*Dalbergia monosperma*, Dalz.; H.f. Ind. Fl. ii. 237).—A scandent shrub, with the branchlets usually hook-

like or tendril-like recurved, the young shoots slightly puberulous; leaves unpaired-pinnate, about 2 in. long, the young rachis slightly puberulous; leaflets usually in 2 pairs, alternate, obovate to cuneate-obovate, on a slender about a line long puberulous petiole, more or less retuse, about an inch long or somewhat longer, entire, membranous, while young sprinkled with minute appressed hairs; flowers small, white, on puberulous pedicels up to  $\frac{1}{2}$  a line long, forming a short tawny puberulous raceme or racemose cyme in the axils of the leaves; calyx about  $1\frac{1}{2}$  lin. long, almost glabrous, the teeth short and broad, blunt; corolla glabrous, about 3 lin. long, the petals long-clawed; stamens 10, united in a single slit sheath; ovary glabrous; pods compressed, lunately-oblong,  $\frac{3}{4}$ -1 in. long, acute, at the base contracted into a short stalk, smooth, brown, 1-seeded.

HAB.—Tidal jungles of Upper Tenasserim.—Fl. March.

### DERRIS, Lour.

Calyx truncate or very shortly and broadly toothed. Standard obovate or orbicular; keel slightly incurved. Upper stamen usually free at the base, but united from the middle with the others in a slit sheath; anthers uniform. Ovary sessile or shortly stalked, with several ovules; style incurved, with a small terminal stigma. Pod flat, oblong or linear, thin or coriaceous, indehiscent, the upper or both sutures bordered with a narrow wing. Seeds 1-2, or rarely 3, very flat, orbicular or reniform.—Tall woody climbers or rarely erect trees with unpaired-pinnate leaves, the leaflets opposite; stipules small and bristle-like or none. Flowers in axillary racemes. Bracts and bractlets small and deciduous.

\* *Stamens monadelphous. Pods narrowly winged along the vexillar suture only.*

× Flowers in simple or almost simple racemes.

○ Pods lanceolate, acuminate or acute at both ends.

Erect tree; leaflets almost acute with a mucro . . . . . *D. robusta*.

Scandent shrub; leaflets notched . . . . . *D. scandens*.

○ ○ Pods oblong or orbicular with rounded ends.  
Scandent shrubs.

Glabrous; pod glabrous . . . . . *D. uliginosa*.

Rusty pubescent; pods pubescent or puberulous; leaflets in 1 or 2 pairs only . . . . . *D. elegans*.

As former, but leaflets usually in 4 pairs; flowers much larger . . . . . *D. elliptica*.

× × Racemes collected into panicles.

Scandent; glabrous pods sinuate-constricted between the seeds . . . . . *D. sinuata*.

\* \* *Stamens monadelphous or the vexillar one free. Pods more or less distinctly winged along both sutures.*

Scandent, glabrous . . . . . *D. amara*.

1. *D. robusta*, Bth.—A tree (30—50 + 15—20 + 4—5), <sup>81</sup>ding leaves in H.S., the very young shoots slightly appressed

pubescent; leaves unpaired-pinnate, about  $\frac{1}{2}$  a foot long; leaflets in 6-10 pairs, oblong or elliptical to ovate-oblong, a little unequal, blunt or nearly so, mucronate, on a  $\frac{1}{2}$  lin. long slender petiolule, 1-1 $\frac{1}{2}$  in. long, entire, membranous, beneath glaucous and shortly appressed pubescent; flowers rather small, white, on capillary 2-3 lin. long puberulous pedicels, solitary or few together, forming a slightly puberulous long axillary raceme; calyx ample, puberulous, about a line deep; corolla glabrous, about 3 lin. long; ovary silky pubescent; pods linear-lanceolate, tapering in a very short stalk, incurved-acute, 1-4-seeded, flat, with a very narrow wing along the outer suture, brown, indistinctly appressed puberulous,  $\frac{1}{2}$ -2 in. long.

HAB.—Frequent in the upper and lower mixed forests of Pegu.—Fl. Apr.—s.—1.—SS.—All.—SiS.

REMARKS.—Wood red-brown, hard and close-grained, of a short coarse fibre, soon attacked by xylophages.

2. *D. scandens*, Bth.; H.f. Ind. Fl. ii. 240; Brand. For. Fl. 154.—*Mee-kyoung-nway*.—A large evergreen scandent shrub, the young parts pubescent; bark dark brown, white-lenticellate; leaves  $\frac{3}{4}$ -1 ft. long, unpaired-pinnate, the rachis glabrous or puberulous; leaflets in 4-6 pairs, opposite or irregularly alternate, from oblong to oval-oblong, on a glabrescent or villous petiolule  $\frac{1}{2}$ -1 lin. long, narrowed at the apex and notched, 1 $\frac{1}{2}$  to 2 $\frac{1}{2}$  in. long, entire, chartaceous, almost glabrous or more or less puberulous beneath; flowers rather small, pale rose-coloured, fragrant, on filiform 2-4 lin. long puberulous or pubescent pedicels, clustered by 3-6 and forming an  $\frac{1}{2}$ -1 ft. long puberulous or rusty villous raceme in the axils of the leaves; calyx minutely rusty pubescent, wide, about 1 $\frac{1}{2}$  lin. deep; corolla 3-4 lin. long, the wings a little hairy; ovary pilose; pods linear-lanceolate, acuminate, 1-4-seeded, flat, sessile, 1-3 in. long, glabrous or minutely puberulous, very narrowly winged along the outer suture only.

HAB.—Frequent all over Burma, from Chittagong, Prome, and Martaban down to Tenasserim and the Andamans, chiefly in alluvial lands in the tidal and swamp forests, but also entering the savannah forests.—Fl. June-July; Fr. C.S.—s: 1.—SS.—All.

3. *D. uliginosa*, Bth.—A large evergreen scandent shrub, all parts quite glabrous; leaves unpaired-pinnate, up to  $\frac{1}{2}$  ft. long, glabrous; leaflets ovate to ovate-oblong, in 1-3 pairs, on a 2 lin. long petiolule, bluntish acuminate, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, entire, chartaceous; flowers middling-sized, pale rose-coloured, on slender 1-2 lin. long pedicels, racemulose or clustered, forming a long glabrous raceme in the axils of the leaves; calyx wide, about a line deep, glabrous; corolla glabrous, about 4 lin. long; ovary slightly pubescent; pods obliquely oval or almost orbicular, rounded with a

stylose mucro, 1-2-seeded, flat, glabrous, 1-1½ in. long, narrowly winged along the outer suture.

HAB.—Frequent in the tidal forests and the low littoral lands, from A. down to Tenasserim and the Andamans.—Fl. March-May; Fr. R.S.—s.—SS. All. Sal.

4. *D. elegans*, Bth.—A large scandent shrub, all softer young parts more or less rusty pubescent; leaves unpaired-pinnate, ½-1 ft long, while young rusty pubescent; leaflets in 1 or 2 pairs only oblong to oblong-lanceolate, on a thick glabrous petiolule about line long, bluntish, 3-5 in. long, chartaceous, entire, rusty pubescent above or on both sides quite glabrescent; flowers white, middling sized, on 3-4 lin. long slender rusty pubescent pedicels, solitary few clustered or the lower ones racemulose, forming a very showy rusty-villous raceme usually arising from above the scars of old leaves or from the leaf-axils themselves; calyx wide, rusty pubescent, about 1½ lin. deep; corolla glabrous, nearly 5 lin. long; ovary tawny villous; pods almost as in *D. uliginosa*, but rusty puberulous or pubescent, 1½ in. long by about an inch broad.

HAB.—Not unfrequent in the swamp forests of the Irrawaddi alluvium along marshy streams of Tenasserim.—Fl. Febr.-March.—s:l.—SS.—All.

5. *D. elliptica*, Bth.—A large scandent shrub, the younger parts all rusty pubescent; leaves ½-1 ft. long, unpaired-pinnate, while young pubescent; leaflets in 4 to 5 pairs with an odd one, on a pubescent petiolule 2 lin. long, oblong to obovate-lanceolate, shortly and rather abruptly acuminate, 3 to 6 in. long, chartaceous, entire, glabrous above, more or less glabrescent beneath; flowers rather large, pinkish, on 2-3 lin. long rusty villous at apex bracteoid pedicels, peduncled-cymulose and forming an elongate rusty pubescent narrow panicle in the axils of the leaves or above the scars of the fallen ones; calyx ample, nearly 2 lin. deep, rusty pubescent; corolla ¾ in. long, appressed tawny silk-hairy; ovary tawny villous; pods elliptic, compressed, rather acute, about 2 long by 1 broad, 1-2-seeded, puberulous and glabrescent, narrowly winged along the vexillar suture.

HAB.—Tenasserim.—Fl. March; Fr. Aug.

6. *D. sinuata*, Thw.—*Myouk-gong-nyin*.—A large scandent shrub, all parts glabrous; leaves up to a foot long, unpaired-pinnate, glabrous; leaflets in 2-3 pairs with an odd one, more or ovate or broadly ovate, on a 2 lin. long petiolule, notched or shallowly notched-apiculate, 3-4 in. long, thin coriaceous, entire, glabrous; flowers pale purplish, rather large, on 1-2 lin. long rusty puberulous pedicels, racemose and collected in a terminal narrow almost glabrous panicle; calyx wide, minutely velvety, about 2 deep; corolla glabrous, about ½ an in. long; vexillar stamens free

ovary pubescent; pods flat, elongate-oblong and often falcate, narrowed at the base, 1-4 in. long, acuminate, sinuate to almost moniliform-constricted between the 1-4 seeds, narrowly winged along the vexillar suture only.

HAB.—Not unfrequent in the beach and tidal forests of Pegu and Tenasserim.—Fr. Nov.-Dec.—l.—SS.—All. Aren. Sal.

7. *D. amœna*, Bth.—A scandent shrub, all parts quite glabrous; leaves unpaired-pinnate, up to  $\frac{1}{2}$  ft. long, glabrous; leaflets in 3-4 pairs, ovate to ovate-oblong, on a 2-3 lin. long petiolule, bluntish or notchedly acuminate, 1-2 $\frac{1}{2}$  in. long, entire, thin coriaceous, beneath glaucous and the lateral nerves very thin and immersed; flowers rather small, on capillary 2-3 lin. long pedicels, clustered and forming a rather long glabrous raceme in the axils of the leaves or several crowded on short branchlets; calyx wide, nearly a lin. deep, glabrous; corolla about 3 lin. long, glabrous; ovary glabrous; pods very flat, more or less oblong, 2-4 in. long, 1-2-seeded, glabrous, along the vexillar suture very narrowly and almost obscurely, along the inner suture broadly (1-2 lin.), winged.

HAB.—Tenasserim.—Fr. March.

## DALBERGIA, L.

Calyx-teeth short, the lowermost rather longer. Standard obovate or orbicular, the keel blunt. Stamens 10, or reduced to 9 in number, all united in a single slit or into 2 equal distinct sheaths; anthers didymous, opening at the top, erect. Ovary stalked, with one or few ovules; style incurved, with a terminal stigma. Pod thin and flat, oblong to linear-oblong or rarely falcate, indehiscent, the thin margins all wing-like expanded or rarely thickened. Seeds solitary or few and remote, very flat and reniform.—Trees or shrubs, often climbing, with unpaired-pinnate leaves, the leaflets usually alternate and without stipulets. Flowers small, in axillary or terminal dichotomous cymes or irregular panicles. Bracts and bractlets usually minute.

### \* *Erect shrubs or trees.*

○ Stamens united into a single slit sheath; flowers white.

× Bractlets fallen before the expansion of the flowers.

Leaflets 3-7, almost orbicular to obovate, notched or blunt; all parts glabrous

Leaflets 7-11, more or less oblong, notched or blunt : : : *D. latifolia*.

× × Bractlets black, short and broad, deciduous, but present during flowering.

Leaflets blunt or more or less notched with a mucro . . . *D. glauca*.

Leaflets acuminate . . . *D. ovata*.

○ ○ Stamens united into 2 separate sheaths; flowers white or purple.

× Pods velvety; flowers purple . . . *D. cana*.

× × Pods quite glabrous.

- † Leaflets apiculate, acute or acuminate, rather large.  
 Leaflets notchedly apiculate; panicles lax, puberulous; flowers  
 white or purplish . . . . . *D. purpurea*.  
 Leaflets acute or shortly acuminate; panicles tomentose, compact;  
 calyx glabrous; flowers white . . . . . *D. glomeriflora*.  
 † † Leaflets blunt or retuse, rather small.  
 Panicle rather compact; pedicels short or very short; flowers pur-  
 ple (?); leaves drying black . . . . . *D. nigrescens*.  
 Panicle very lax; pedicels slender; flowers white or purplish out-  
 side; leaves not nigrescent . . . . . *D. paniculata*.  
 \* \* *Climbing or scandent shrubs*.  
 ○ Stamens united in 2 separate sheaths; leaflets blunt  
 or notched.  
 Leaflets 11-13; inflorescence densely pubescent; bractlets minute *D. volubilis*.  
 Leaflets 17-21; inflorescence glabrous; bractlets small, but conspi-  
 cuous . . . . . *D. stipulacea*.  
 ○ ○ Stamens united in a single slit sheath.  
 × Leaflets in 6-7 pairs, retuse or blunt; inflorescence,  
 etc., glabrous.  
 Flowers blue; panicle simple, terminal; leaflets more or less oblong *D. foliacea*.  
 Flowers white; panicle small, axillary; leaflets more or less obovate *D. rubiginosa*.  
 × × Leaflets in 11-41 pairs; inflorescence and young  
 branchlets rusty pubescent.  
 Leaflets  $\frac{1}{2}$ - $\frac{1}{2}$  in. long; panicle or cyme very short . . . . . *D. tamarindifolia*.  
 Leaflets 1-2 in. long; panicle ample . . . . . *D. velutina*.

1. *D. latifolia*, Roxb.; H.f. Ind. Fl. ii. 231; Bedd. Syl. Madr. t. 24; Brand. For. Fl. 148.—A leaf-shedding tree (40—5 + 20—25 + 3—6), all parts glabrous; leaves unpaired-pinnate, 4-in. long, glabrous; leaflets alternate, in 1-3 pairs, almost orbiculate to broadly obovate, on a 3-4 lin. long petiolule, 1-2 in. long, broad or broader, notched, entire, thin coriaceous, glabrous, greenish-green; flowers small, white, strong-smelling, on slender 1 lin. long pedicels, forming a solitary or several quite glabrous subpanicle-like cymes in the axils of the leaves or above the fallen ones; calyx pale-greenish, smooth,  $1\frac{1}{2}$  lin. long, the reduced teeth acute, the others blunt; corolla glabrous, about 2 in. long, the petals rather long-clawed; stamens 9, united in a single slit sheath; ovary glabrous; pods lanceolate or oblong-lanceolate, acuminate at both ends, tapering in a slender stalk, very rigidly chartaceous, brown, smooth, slightly net-veined at the seeds.

HAB.—Andamans (accord. Roxb.).

REMARKS.—Heart-wood greenish or greyish black, often mottled or ringed, veined, close-grained, takes a fine polish. Used in India extensively for car- work, knees of vessels, agricultural implements, combs, etc., also in gun- factories.

2. *D. cultrata*, Grah.; H.f. Ind. Fl. ii. 233.—*Fendike*.—A pressed silky pubescent; bark  $\frac{1}{2}$  an in. thick, rather smooth, transverse short streaks; cut brown; leaves unpaired-pinnate, 5-6 long, while very young canescent or appressed tawny pubes-

leaves alternate, in 3-5 pairs, elliptical to obovate-oblong, on a rather slender 1-2 lin. long petiolule, notched, 1-2 in. long, entire, thin coriaceous, glabrous; flowers small, white, or rarely pale rose-coloured, on capillary 2 to 3 lin. long pedicels, forming small dichotomous minutely pubescent cymes or cymose panicles in the axils of the young leaves or above the scars of the fallen ones; calyx puberulous or glabrous, nearly  $1\frac{1}{2}$  lin. long, the teeth rather large, acute; corolla glabrous, about 2 lin. long; petals fringed; stamens 9, united in a single slit sheath; ovary glabrous; pods very flat, oblong to linear-oblong, 1-2½ in. long, contracted in a 3-4 lin. long stalk, blunt, brown or greyish brown, glabrous, slightly net-veined at the 1-3 seeds.

HAB.—Common in all leaf-shedding forests, especially in the upper mixed savannah and Eng forests, all over Burma from Ava and Martaban down to Upper Tenasserim.—Fl. March-Apr.; Fr. C. S.—l.—SS. =  $\infty$  SiS.

REMARKS.—Sap-wood pale-coloured, turning pale-brown, perishable; heart-wood extremely durable, blackish and ebony-like, sometimes white and red-streaked, close-grained, rather heavy, elastic, but cracky,  $\rho = 64$  pd. Used for ploughs, bows, handles of dais and spears. Exudes a red resin.

3. *D. glauca*, Wall.; H.f. Ind. Fl. ii. 231.—*Ma-da-ma*.—A tree 30—40 + 10—15 + 3—4), shedding leaves during H.S., all parts glabrous, the stem usually fluted and buttressed; bark brownish grey, about  $1\frac{1}{2}$  lin. thick, longitudinally striate and minutely fissured; cut dry, brownish; leaves ½-1 ft. long, unpaired-pinnate, glabrous; leaflets in 3-4 pairs, alternate, obovate to elliptical, on a 2-3 lin. long petiolule, rounded or more or less retuse with a mucro, 2-4 in. long, entire, chartaceous, glabrous, somewhat glaucous beneath; flowers odorous, white, each supported by a broad black very deciduous bractlet, on very short but slender puberulous pedicels, cymose, forming an ample glabrous (the extreme branchings puberulous) panicle at the end of the branchlets; calyx 2 lin. long, glabrous, the teeth blunt; corolla 2 lin. long, glabrous, the petals long-clawed; stamens 9, in a single slit sheath; ovary glabrous; pods very flat, oblong to linear-oblong,  $1\frac{1}{2}$ -2 in. long, narrowed in a short stalk, blunt, glabrous, brown or reddish brown, almost chartaceous, slightly net-veined at the 1 or 2 seeds.

HAB.—Frequent in the upper mixed forests of Pegu; less frequent in those of Martaban down to Tenasserim.—Fl. Jan.-Feb.; Fr. March-May.—s—l.—SS. = SiS. Metam.

4. *D. ovata*, Grah.; H.f. Ind. Fl. ii. 231.—*Ma-damah*.—A tree (25—35 + 10—15 + 2—3), shedding leaves during H.S., all parts quite glabrous; leaves unpaired-pinnate, glabrous, ½-¾ ft. long; leaflets alternate, ovate to obovate-oblong, on a 2-3 lin. long petiolule, acuminate, 2-3 in. long, entire, chartaceous, glabrous, a little glaucous beneath; flowers white, odorous, small, each supported by

a small black broad deciduous bractlet, on very short pubescent pedicels, cymose and forming a slightly appressed pubescent glabrescent panicle in the axils of the leaves or above the scars of the fallen ones and collected into a large panicle at the end of the branchlets; calyx glabrous, about 2 lin. long, the teeth rather long and bluntish; corolla glabrous, about 2 lin. long; stamens 9, in a single slit sheath; ovary glabrous; pods very flat, oblong to linear-oblong, blunt with or without a point, tapering in a short stalk,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, coriaceous, glabrous, greyish brown, slightly net-veined at the 1 or 2 seeds.

HAB.—Frequent in the upper mixed forests of the Pegu Yomah, less so in those from Martaban down to Upper Tenasserim, especially along choungs.—Fl. Jan.-Febr.; Fr. Apr.-May.—s+l.—SS.—SiS. Metam.

5. *D. cana*, Grab.; H.f. Ind. Fl. ii. 237.—A tree (40—60+15—30+3—0), shedding leaves in H.S., the young parts slightly tawny pubescent, glabrescent; bark about  $\frac{1}{2}$  in. thick, grey, peeling off in little brittle irregular pieces; cut greenish-dark-brown; leaves unpaired-pinnate, 1-2 ft. long, while young slightly pubescent, soon glabrescent; leaflets in 7-9 pairs, alternate, on a pubescent glabrescent petiolule 1- $1\frac{1}{2}$  lin. long, oblong to linear-oblong, often somewhat unequal, shortly and rather abruptly acuminate, 2- $2\frac{1}{2}$  in. long, entire, chartaceous, when full grown glabrous, or slightly puberulous beneath; flowers small, purple, on capillary puberulous 1-2 lin. long pedicels, forming a lax puberulous short-peduncled panicle in the axils of the leaves or arising from above the scars of the fallen ones; calyx purple, glabrous or nearly so, about 2 lin. long, the teeth blunt; corolla glabrous, nearly 3 lin. long, the petals long-clawed; stamens 10, united in 2 separate sheaths; ovary pilose; pods flat, linear-oblong or linear, blunt, contracted in a short stalk, 3-4 in. long, tawny-velvety, indistinctly veined at the 3-1-seeds.

HAB.—Frequent in the tropical forests, especially along choungs, of the eastern slopes of the Pegu Yomah, and still more frequent from Martaban down to Tenasserim.—Fl. March; Fr. C. S.—s.—SS.—SiS. Metam.

REMARKS.—Wood white, turning brownish, rather heavy, of a very coarse fibre, soon attacked by xylophages.

6. *D. purpurea*, Wall.; H.f. Ind. Fl. ii. 235.—*Thit-pote* or *thit-poh*.—A tree (40—60+15—20+5—0), leafless in H.S., all parts glabrous; leaves unpaired-pinnate,  $\frac{2}{3}$ - $1\frac{1}{2}$  ft. long, the young rachis a little puberulous; leaflets usually in 4 pairs, alternate, obovate-oblong to oblong, on an  $\frac{1}{2}$ -1 lin. long, puberulous, glabrescent petiolule, apiculate or blunt, 2-4 in. long, entire, thin coriaceous, glabrous; flowers small, pale purplish or almost white, on slender puberulous pedicels up to a line long, cymose, forming purplish coloured minutely puberulous glabrescent panicles, rather crowdedly arising from the short shoots or branchlets; calyx purple,

minutely puberulous, more than a line long, the teeth blunt; corolla glabrous, more than 3 lin. long, the petals rather long-clawed; ovary pubescent; stamens 10, united in 2 separate sheaths; pods flat, oblong-lanceolate, tapering in a stalk, bluntish, 3-3½ in. long, 1-seeded, coriaceous, glabrous, brown, obsoletely veined at the seed.

HAB.—Common in all mixed forests from Pegu and Martaban down to Upper Tenasserim, up to 3,500 ft. elevation.—Fl. Febr.-March; Fr. C. S.—l.—SS.—∞ *SiS*.

REMARKS.—Sap-wood light, not much used; heart-wood black and ebony-like.

7. *D. glomeriflora*, Kz.; H.f. Ind. Fl. ii. 236.—A tree (30—40 + 10—20 + 4—5), leafless in H.S., the young shoots tawny tomentose; leaves while very young tomentose, turning glabrous, unpaired-pinnate; leaflets in 3-4 pairs, alternate, ovate to elliptical and obovate, on a slightly pubescent petiolule 1-2 lin. long, acute, 2-2½ in. long, entire, thin coriaceous, glabrous above, beneath shortly and slightly pubescent; flowers small, white, on very short pedicels or almost sessile, densely crowded into head-like panicles terminating the young villous shoots or arising from above the scars of the fallen leaves; calyx about 1½ lin. long, glabrous, the teeth blunt; corolla glabrous, a little longer than the calyx, the petals very shortly clawed; stamens 10, united in 2 separate short sheaths; ovary glabrous.

HAB.—Rather rare in the upper mixed forests of the Prome Yomah at 1,000 to 2,000 ft. elevation.—Fl. March-Apr.—l.—SS.—CaS.

8. *D. paniculata*, Roxb.; H.f. Ind. Fl. ii. 236; Bedd. Sylv. Madr. 88; Brand. For. Fl. 150.—*Tn-pouk-pen*.—A tree (60—80 + 30—50 + 8—9), leafless in H.S., the young shoots slightly and shortly puberulous; bark about ½ in. thick, grey, peeling off in small convex flakes; leaves unpaired-pinnate, 3-6 in. long, the young rachis puberulous; leaflets in 4-6 pairs, oval to obovate-oblong, on a slender 1-1½ lin. long petiolule, retuse or blunt, 1-2 in. long, entire, thin chartaceous, glabrous; flowers small, white, often bluish outside, on slender puberulous pedicels about a line long, forming shortly puberulous dichotomously branched lax and spreading panicles arising from above the scars of the fallen leaves; calyx 1½ lin. long, appressed pubescent, the teeth acute; corolla glabrous, nearly 3 lin. long, rather long-clawed; stamens 10, united into 2 separate sheaths; ovary almost glabrous, the stalk pubescent; pods flat, oblong-lanceolate to oblong, blunt or bluntish, rather abruptly tapering in a 3-4 lin. long stalk, rigidly but thin coriaceous, glabrous, slightly net-veined at the 1-3 seeds.

HAB.—Frequent in mixed dry forests, occasionally entering the drier upper mixed forests, from Ava and Prome to Pegu.—Fl. March; Fr. May-June.—L.—SS. = CaS. SiS. (?)

REMARKS.—Wood white, turning pale-yellowish, strong, compact. Good for common house-building.

9. *D. nigrescens*, Kz.—*Thitsa-nweng*.—A leaf-shedding tree (40—50+10—25+4—6), the shoots tawny pubescent, all softer parts turning black in drying; leaves unpaired-pinnate, the rachis tawny pubescent and more or less glabrescent; leaflets in 3 to 5 pairs with an odd one, on a line long pubescent petiolule, elliptical to oblong, alternate,  $\frac{1}{2}$ – $1\frac{1}{2}$  in. long, rounded or almost retuse, chartaceous, glabrous when full grown; flowers small, blue (?), very shortly pedicelled or almost sessile, cymulose and forming dense rusty or tawny tomentose panicles at the end of the branches; calyx nearly  $1\frac{1}{2}$  lin. long, densely tawny pubescent, the teeth acute; corolla glabrous, 2 lin. long, the petals shortly clawed; stamens united into 2 separate sheaths.

HAB.—Frequent in the dry forests, especially the mixed ones, of Prome and Ava—L.—SS. = CaS.

\* \* *Climbing or scandent shrubs.*

10. *D. volubilis*, Roxb.; H.f. Ind. Fl. ii. 235; Brand. For. Fl. 152.—A large spreading shrub, usually more or less scandent, all parts glabrous; leaves unpaired-pinnate, glabrous,  $\frac{1}{2}$ – $\frac{2}{3}$  ft. long; leaflets in 5 to 6 pairs, alternate, elliptically to oval- and obovate-oblong, on a slender 2–1 lin. long petiolule, rounded or almost retuse with a minute mucro,  $\frac{1}{2}$ –2 in. long or rarely longer, membranous or thin chartaceous, entire, glabrous, usually glaucous beneath; flowers pale-blue, small, on slender 1–2 lin. long rusty puberulous pedicels, cymose and forming a rusty or tawny tomentose spreading panicle at the ends of the branchlets; bracts at the insertion of the pedicels, small, rusty-tomentose; calyx about a lin. long, puberulous, the teeth rather broad and long, rather blunt; corolla glabrous, about 3 lin. long, the petals cuneate at base, the standard broad; stamens 10, united into 2 separate sheaths; ovary pubescent; pods flat, oblong, tapering in a short stalk, blunt, thin coriaceous, glabrous, brown, slightly net-veined at the usually solitary or rarely 2 seeds.

HAB.—Frequent in all mixed forests, especially the lower ones, all over Burma from Chittagong, Ava, and Martaban down to Upper Tenasserim.—Fl. Febr.-March; Fr. Apr.-May—L.—SS. = ∞.

11. *D. stipulacea*, Roxb.; H.f. Ind. Fl. ii. 237.—*Douk-ta-loung-nway*.—A large climbing shrub, the stems 2–4 in. thick, the young shoots more or less puberulous; bark brownish grey, longitudinally fissured, fibrous; leaves unpaired-pinnate,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, the young rachis usually puberulous; leaflets in 8 to 10 pairs,

alternate, from oblong to obovate-oblong, on a slender a line long petiolule, more or less retuse, rounded at the base, 1-2 in. long, entire, thin chartaceous, while young minutely appressed pubescent beneath, turning soon glabrous and somewhat glaucescent; flowers small, pale-blue, each supported by a pair of lanceolate bractlets a line long, on  $1\frac{1}{2}$  to 2 lin. long slender puberulous pedicels, racemose and forming peduncled slightly pubescent cymes arising laterally from the young shoots or above the scars of the fallen leaves; bracts rather persistent, about as long as the pedicels, lanceolate; calyx glabrous, about  $1\frac{1}{2}$  lin. long, the teeth blunt, those in front acute; corolla glabrous, about 3 lin. long, the standard broad, the petals shortly and broadly clawed; stamens 10, united into 2 separate sheaths; ovary glabrous; pods elongate-oblong, 2-3 in. long, blunt, contracted in a short stalk, coriaceous, glabrous, brown, 1 or rarely 2-seeded, the unripe ones flat and veined at the seeds, the full-grown ones somewhat medullary-thickened with the venation furrowed-immersed.

HAB.—Common all over Pegu and Martaban down to Tenasserim, occurring not only in the mixed and tropical forests, but ascending also into the drier hill forests, up to 3,500 ft. elevation.—Fl. Jan.-Febr.; Fr. C.S.—s: 1.—SS.=∞.

12. *D. foliacea*, Wall.; H.f. Ind. Fl. ii. 232.—A large scandent shrub, all parts glabrous, or the young shoots slightly pubescent; leaves unpaired-pinnate,  $\frac{1}{2}$ - $\frac{1}{2}$  ft. long; leaflets in 2-3 pairs, alternate, obovate to elliptically-oblong, on an 1 to  $1\frac{1}{2}$  lin. long petiolule, retuse and usually mucronate,  $1\frac{1}{2}$ -2 in. long, entire, chartaceous, glabrous, or while young shortly appressed puberulous beneath; flowers small, almost sessile, supported by a pair of small bractlets, cymose and forming an ample minutely puberulous glabrescent panicle at the end of the branchlets; calyx minutely puberulous, 2 lin. long, the teeth rather long, hunchish; corolla glabrous, about 2 lin. long, the petals long-clawed; stamens 9, united into a single slit sheath; ovary glabrous; pods 1-2-seeded, flat, oblong to elongate-oblong, acute or blunt, tapering in a short stalk,  $1\frac{1}{2}$ -3 in. long, glabrous, brown, thin coriaceous, runcinnate-veined at the seeds.

HAB.—Not unfrequent along choungs in the upper mixed forests of the Pegu Yomah and Martaban down to Upper Tenasserim.—Fl. Jan.-Febr.; Fr. C.S.—s: 1.—SS.—SiS. Metam.

13. *D. rubiginosa*, Roxb.; H.f. Ind. Fl. ii. 232.—A large scandent shrub, the very young branchlets shortly tawny pubescent; leaves unpaired-pinnate,  $2\frac{1}{2}$ -3 in. long, the rachis glabrous; leaflets in 3 to 5 pairs with an odd one, alternate, obovate to obovate-oblong, rounded or emarginate, on a line long slender petiolule, about an in. long, entire, thinly but rigidly coriaceous, glabrous, much net-veined; flowers small, white, on very short puberulous pedicels, racemose

and forming a small shortly rusty or tawny pubescent panicle in the axils of the leaves; calyx about a line long, pubescent; corolla glabrous, about 3 lin. long; stamens united in a single slit sheath; ovary glabrous; pods flat, lanceolate to linear-lanceolate, tapering in a slender stalk, bluntish,  $1\frac{1}{2}$  to 2 in. long, 1-2-seeded, brown, glabrous, much veined round the seeds.

HAB.—Not unfrequent in the tropical forests on the Kambala tounge Yomah.—SS.=probably decomposed CaS.

14. *D. tamarindifolia*, Roxb.; H.f. Ind. Fl. ii. 234.—A scandent shrub, the young parts more or less tawny pubescent; leaves unpaired-pinnate, 3-6 in. long, while young much pubescent; leaflets in 7 to 20 pairs, on a very short petiolule or almost sessile, oblong to almost rhomboid-oblong, unequal at the base, retuse,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, entire, membranous, when full grown glabrescent above and slightly appressed pubescent beneath; flowers small, white, supported by a pair of small villous bractlets, on very short pedicels or almost sessile, in cymes or short small rusty or tawny villous panicles in the axils of the leaves; bracts small, ovate; calyx slightly appressed pubescent,  $1\frac{1}{2}$  lin. long, the teeth short, 2 of them blunt, the rest acute; corolla glabrous, 2 lin. long; the petals very long-clawed; stamens 9 or 10, united in a single slit sheath; ovary glabrous; pods very flat, oblong to linear-oblong, 1-3-seeded, almost chartaceous, red-brown, glabrous, blunt or a little acute, narrowed in a slender but short stalk, 1-2 in. long, net-veined at the seeds.

HAB.—Not unfrequent in the jungles of the Andamans; also Tenasserim.—Fr. May-June.

15. *D. velutina*, Bth.; H.f. Ind. Fl. ii. 233.—A large climbing shrub, all softer parts rusty or tawny pubescent; stipules in young shoots conspicuous,  $\frac{1}{2}$  an in. long, linear to ovate, softly pubescent; leaves unpaired-pinnate, rusty or tawny pubescent,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long; leaflets in 5-9 pairs, alternate, oblong, on a thick tomentose petiolule a line long, blunt or almost notched, 1-1 $\frac{1}{2}$  in. long, membranous to chartaceous, entire, puberulous above, tawny pubescent beneath; flowers small, on short but slender pubescent pedicels, cymose, forming smaller or larger rusty or tawny tomentose panicles along the young shoots or from the axils of the young leaves or from above the scars of the fallen ones; calyx rusty pubescent, about  $\frac{1}{2}$  lin. long, the upper teeth blunt, the others acute; corolla glabrous, nearly 3 lin. long; the petals long-clawed; stamens 10, united into a single slit sheath; ovary glabrous; pods flat, elongate-oblong or oblong, usually 1- rarely 2-seeded, blunt, tapering in a very short stalk,  $1\frac{1}{2}$ -2 in. long, glabrous, net-veined at the seeds.

HAB.—Frequent in the tropical forests, and ascending into the drier hill forests, from Pegu and Martaban down to Tenasserim, up to 4,000 ft. elevation.—Fl. March.—s: l.—SS.—Metam. Lat. p.

# PTEROCARPUS, L.

Calyx turbinate-bell-shaped, with the base acute, often incurved 5-toothed, almost 2-lipped. Standard orbicular or broadly ovate, the wings obliquely obovate or oblong and almost conform with the keel-petals or longer, free or slightly connate. Stamens united in a single or 2 distinct sheaths with the vexillar one free or not; anthers versatile. Ovary sessile or stalked, with 2 to 6 ovules; style filiform with a minute terminal stigma. Pod compressed-winged all round, indehiscant, orbicular, ovate or oval-oblong, more or less oblique or falcate with a lateral or rarely terminal style. Seeds 1 or 2, separated by hard septa, oblong or almost reniform.—Trees, with pinnate leaves, the leaflets alternate or irregularly opposite, without stipulets. Flowers usually yellow, in racemes or racemose panicles. Braets and braetlets small, deciduous.

Pods about an in. broad, also while young almost glabrous; calyx

more glabrous

*P. Indicus.*

Pods about 1½-2 in. broad, when young densely velvety-pubescent;

calyx rusty pubescent

*P. macrocarpus.*

1. *P. Indicus*, Willd.; H.f. Ind. Fl. ii. 238; Bedd. Sylv. Madr. t. 23.—*Pa-touk*.—A tree (50—80+20—50+5—9), leafless in H.S., the very young shoots slightly tawny pubescent; leaves unpaired-pinnate, ½-1 ft. long, while very young a little pubescent, soon quite glabrous; leaflets more or less ovate to elliptical, alternate, in 3-4 pairs, on a slender 1-2 lin. long glabrous petiolule, shortly and abruptly bluntish acuminate or apiculate, 2-3 in. long, entire, thin chartaceous, glabrous when full grown; flowers middling-sized, yellow, on a slender 2-3 lin. long puberulous or glabrescent pedicel, racemose, forming a simple axillary puberulous raceme or more usually collected in an axillary and terminal glabrescent panicle; calyx about 3 lin. long, tapering at the base and somewhat oblique, almost glabrous or puberulous; corolla nearly 4 lin. long, the petals crispate-undulate; stamens finally separating in 2 sheaths; ovary appressed pubescent; pods (also while young) glabrous, irregularly orbicular, unequally sinuate-notched at the base and shortly stalked, about an inch across each way, the stylous acumination above the basal sinus.

HAB.—Frequent in the upper mixed forests from Martaban down to Tenasserim and the Andamans; very rare along the eastern slopes of the Pegu Yomah.—Fl. May-June; Fr. July-Aug.—SS.=*Metam.* Lat. p. SiS.

REMARKS.—Wood light-brown with lighter-coloured heart-wood, coarsely fibrous, but close-grained, narrowly streaked, heavy. Excellent for the solid Burmese cart-wheels. Yields gum-kino.

2. *P. macrocarpus*, Kz.; H.f. Ind. Fl. ii. 239.—*Pa-touk*.—A tree (80—50+10—25+5—6), leafless during H.S., the young

shoots more or less tawny pubescent; bark blackish grey, nearly an in. thick, rough, peeling off in small pieces; cut red, exuding a red resin; leaves unpaired-pinnate,  $\frac{1}{2}$ - $\frac{2}{3}$  ft. long, the rachis rusty puberulous; leaflets from ovate to oblong, in 3 to 5 pairs, alternate, on a rusty pubescent 1-2 lin. long petiolule, shortly and bluntish acuminate, mucronate,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, entire, thin coriaceous, while young tawny pubescent beneath and more or less glabrescent except on the nerves; flowers middling-sized, yellow, on tawny pubescent 3-4 lin. long pedicels, forming simple tawny pubescent racemes in the axils of the leaves; calyx densely rusty velvety, about 3 lin. long, somewhat obliquely narrowed at the base; corolla more than 3 lin. long, the petals undulate-crispate; stamens united in 2 separate bundles; ovary villous; pods while young greyish or tawny velvety pubescent and less so when fully ripe, irregularly orbicular, with the wing somewhat folded,  $1\frac{1}{2}$ -2 in. broad, unequally sinuate-rounded at the base, the minute stylous point above the basal sinus.

HAB.—Frequent in the Eng and upper mixed forests of Martaban and Tenasserim, very rare in the dry forests of Prome District.—Fl. Apr.-May; Fr. R.S.—l.—SS.—*Metam.*, Lat. CaS.

REMARKS.—Sap-wood pale-brown, streaked, rather light, close-grained. Yields a red resin, a sort of gum-kino.

### MILLETTIA, WA.

Calyx broad, truncate, or with short teeth or lobes, the 2 upper ones often united. Standard broad, usually reflexed; keel incurved, blunt. Stamens 10, all united in a sheath or the vexillary one free or cohering with the others from the middle; anthers uniform. Ovary sessile or rarely stalked, surrounded at the base with an angular or cup-shaped disk, several-ovuled; style inflexed with a small terminal stigma. Pods flat or convex, from woody to thin coriaceous, finally dehiscing into 2 valves. Seeds orbicular or reniform, not strophiolate.—Trees or shrubs, often climbing, with unpaired-pinnate leaves, the leaflets usually stipellate. Stipules small. Flowers in terminal racemes or panicles. Bracts and bractlets usually very deciduous.

\* *Climbers or erect shrubs.*

× Standard auricled at the base on both sides of the claw.

Stamens monadelphous.

○ Corolla glabrous.

Young shoots rusty-tomentose; corolla violet-purple; ovary quite glabrous

○ ○ Corolla, at least the standard, velvety or silky pubescent outside.

*M. leiogyna.*

+ Leaflets blunt or apiculate, rarely shortly acuminate. Branches brown.

Flowers purple, in elongate racemes longer than the petiole; ripe pods glabrous

*M. extensa.*

- Flowers white, in elongate racemes longer than the petiole; ripe pods brown tomentose . . . . . *M. macrophylla*.
- Flowers rose-coloured, in simple racemes usually shorter than the petiole; leaflets blunt; pods tawny or brown tomentose . . . . . *M. fruticosa*.
- + + Leaflets glaucous beneath, long and enudate-acuminate; branches grey . . . . . *M. caudata*.
- × × Standard not auricled at the base.
- + Corolla, at least the standard, velvety or silky pubescent outside.
- Pods rusty or tawny velvety; leaves silvery or coppery silky beneath . . . . . *M. sericea*.
- Pods finely brown-velvety; leaves glabrous . . . . . *M. coerulea*.
- + + Corolla glabrous. Ovary pubescent or villous.
- Leaves glabrous; flowers racemose, in terminal panicles . . . . . *M. cinerea*.
- Young shoots and under-surface of leaves pubescent; calyx broader than deep . . . . . *M. pachycarpa*.
- As former, but glabrescent; flowers much smaller; calyx longer than wide . . . . . *M. monticola*.
- Leaflets rather blunt, thinly appressed canescent beneath; pods obscurely grey-canescant . . . . . *M. cana*.
- \* \* Erect trees. Stamens usually monadelphous, rarely diadelphous.
- × Stamens monadelphous. Pods more or less woody or rigidly coriaceous. Seeds much compressed.
- Valves of pod flat or slightly convex, without prominent edges.
- Young parts and leaves slightly pubescent; corolla glabrous, lilac; pods appressed puberulous . . . . . *M. pulchra*.
- Young parts slightly pubescent; corolla pubescent, lilac; pods glabrous . . . . . *M. Brandisiana*.
- Young shoots silky pubescent; corolla glabrous, white; pods thick, lenticellate-rough . . . . . *M. leucantha*.
- Glabrous; corolla glabrous, blue; pods thick, warted . . . . . *M. ovalifolia*.
- ○ Valves of pod extended into prominent ledges or short wings.
- Young shoots slightly pubescent; leaflets bluntish acuminate; racemes almost glabrous; flowers steel-blue; pods almost winged . . . . . *M. glaucescens*.
- As former, but the racemes pubescent; flowers white . . . . . *M. pubinervis*.
- Shortly tomentose, especially while young; leaflets rounded; flowers pale-blue; pods waved-winged . . . . . *M. tetraptera*.
- × × Stamens diadelphous. Pods leathery, the valves very convex and torose, smooth. Seeds not compressed.
- Glabrous; flowers dark-purple . . . . . *M. atropurpurea*.

\* *Climbers or erect shrubs.*

1. *M. leiogyna*, Kz.; H.f. Ind. Fl. ii. 109.—A large leaf-shedding scandent shrub, with cylindrical arm-thick stems, the young shoots rusty-tomentose, the branches terete, minutely lenticellate; bark  $\frac{1}{2}$  in. thick, roughish, fissured, blackish; cut red; leaves (very young) brown tomentose, unpaired-pinnate; leaflets in 4-6 pairs with an odd one; flowers rather large, violet, with the standard yellow in centre, on 2-3 lin. long, nodding, velvety pedicels, in 4-5 in. long brown tomentose racemes arising from short lateral branches or growing out into an ample lateral panicle; calyx

broadier than long, 2-2½ lin. deep, tawny velvety, obsoletely toothed, the anterior tooth a little prolonged; corolla glabrous, the standard ½ an in. long, notched; ovary smooth; very young pods linear, smooth, terminating in a long subulate genuflexed point.

HAB.—Rare in the upper mixed forests of Toukyeghat, east of Tounghoo, Martaban.—Fl. Apr.—l.—SS. = Metam.

REMARKS.—Wood rather heavy, yellowish, turning light-brown, coarsely fibrous, but rather close-grained, tolerably soft. Yields a red resin.

2. *M. extensa*, Bth.; H.f. Ind. Fl. ii. 109.—*Da-ma-gnai-nway*.—A large scandent shrub, the softer younger parts tawny or rusty velvety-pubescent, the branchlets usually minutely warted; leaves unpaired-pinnate, ½-1 ft. long, the rachis glabrescent; leaflets in 4-3 pairs, on a strong glabrescent petiolule 2 lin. long, ovate to elliptically oblong, bluntish apiculate to bluntish, 3-4 in. long, entire, rigidly chartaceous, while young on both sides thinly pubescent, finally turning glabrous above and slightly and minutely pubescent beneath; flowers rather small, reddish-lilac, on 1-2 lin. long velvety pedicels, solitary and clustered, forming tawny velvety 4-6 in. long racemes several or many together arising from the thick, usually short, scaly, lateral branchlets; calyx tawny velvety, about 2 lin. deep, broader than long, obsoletely and broadly toothed; standard about ½ in. long, notched, silky pubescent outside; ovary and young fruits tawny pubescent; pods linear-oblong, abruptly incurved-pointed, flat, 4-5 in. long, a little thickened along the sutures, when ripe quite glabrous.

HAB.—Frequent all over Burma, from Ava and Martaban down to Tenasserim, in all leaf-shedding forests up to 2,000 ft. elevation.—Fl. March-Apr.; Fr. C.S.—l.—SS.=∞.

3. *M. fruticosa*, Bth.; H.f. Ind. Fl. ii. 109.—A low scandent shrub, the branchlets pubescent; leaves long-petioled, ½-1 ft. long; leaflets in 4-5 pairs with an odd one, oblanceolate-oblong to oblong, 4-6 in. long, blunt or bluntish, glabrous above, thinly silk-hairy beneath; flowers purple, almost sessile, in dense short axillary racemes usually shorter than the petiole and sometimes collected in a terminal panicle; calyx 1½ lin. deep, densely silk-hairy, subtended by minute ovate bracts and bractlets; corolla ¾ in. long, rose-coloured, the standard densely silk-hairy; pod linear-oblong, woody, 2½-3½ in. long, silk-hairy when young.

HAB.—Pegu (accord. to Baker).

4. *M. caudata*, Bak. in H.f. Ind. Fl. ii. 109.—A low scandent or creeping shrub, all parts glabrous or nearly so; stipulets minute; leaflets in 3-4 pairs with an odd one, oblong to lanceolate, 4-6 in. long, long and more or less caudate-acuminate, chartaceous, glabrous, glaucous beneath; flowers rose-coloured, pedicelled, in slender

axillary short-peduncled racemes; bracts very minute; calyx bell-shaped,  $1\frac{1}{2}$  lin. deep, obsoletely toothed, densely silk-hairy; corolla 3-4 lin. long, densely silk-hairy; pods linear, rigidly coriaceous, turgid, 3-4 in. long, glabrous.

HAB.—In the stony beds of Martaban, rare.

5. *M. cinerea*, Bth.; H.f. Ind. Fl. ii. 106.—A large scandent shrub, all parts glabrous, the branchlets smooth; leaves unpaired-pinnate, glabrous, about  $\frac{1}{2}$  ft. long, the stipulets small, subulate-acuminate, longer persistent; leaflets in 2, rarely in a single, pair with a jointed long petioled odd one, elliptical to ovate and elliptically ovate, on a lin. long petiolule, bluntish apiculate or rarely almost acuminate, 2-4 in. long, entire, chartaceous, glabrous and net-veined; flowers rather large, white, with the tips of keel and wings purple, on 2 lin. long tawny velvety pedicels, racemose and forming a greyish or tawny-greyish velvety spreading panicle at the end of the branchlets; calyx broader than long, nearly 2 lin. deep, 2-lipped, the anterior 3 teeth acuminate, the posterior two 2-lobed-connate; corolla silky pubescent, the standard  $\frac{1}{2}$  an in. long; ovary densely tawny villous; pods linear-lanceolate, incurved-acuminate, flat, with abruptly thickened sutures, 2-3 in. long, densely tawny velvety, several-seeded.

HAB.—Chittagong; Burma.—Fl. May.

6. *M. sericea*, WA.; H.f. Ind. Fl. ii. 104.—A large scandent shrub with terete arm-thick stems, the younger parts tawny or silvery appressed-pubescent; bark blackish grey, smooth; leaves unpaired-pinnate, 1-2 ft. long, the rachis minutely pubescent glabrescent; leaflets in 3 or 2 pairs with a longer jointed-petioled odd one, elliptically ovate to oblong-lanceolate, on a pubescent petiolule 2-3 lin. long, long and finely acuminate, 3-6 in. long, entire, chartaceous, glabrescent above, beneath more or less silvery appressed pubescent; flowers purple with the standard brownish outside, the wings rose-coloured and the keel whitish, rather small, on nodding 2-3 lin. long tawny velvety pedicels, clustered, arranged in a slender more or less puberulous somewhat pendulous 1-1 $\frac{1}{2}$  ft. long raceme arising singly or rarely by pairs from above the scars of the fallen leaves; calyx a little oblique, about 2 lin. deep, tawny velvety pubescent, obsoletely sinuate-toothed; corolla silky pubescent, the standard  $\frac{1}{2}$  an in. long; ovary pubescent; pod linear-oblong, incurved-pointed, 2-3 in. long, flat, with abrupt sutures, densely and shortly rusty-tomentose or velvety, several-seeded.

HAB.—Rather frequent in the tropical forests of Martaban, east of Tounghoo; also Ava, Kakhien hills.—Fl. Apr.-May.—s.—SS.—Metam.

7. *M. pachycarpa*, Bth.; H.f. Ind. Fl. ii. 106.—A very large scandent shrub, all softer parts covered with a short, soft, rusty-

brown tomentum, the branches warted; leaves unpaired-pinnate,  $\frac{1}{2}$ - $1\frac{1}{2}$  ft. long, the rachis rusty-tomentose; leaflets in 5 to 6 pairs with an odd one, on a 1-2 lin. long tomentose petiolule, obovate-oblong to oblong, apiculate or bluntish and mucronate, rarely shortly acuminate, 3-5 in. long, entire, membranous, thin chartaceous, while young on both sides tawny or rusty pubescent or almost tomentose, glabrescent above; flowers rather large, pale-rose coloured on 2-3 lin. long tomentose nodding pedicels, clustered and forming 1-3 or rarely more  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long rusty or tawny tomentose racemes arising from above the scars of the fallen leaves or from axillary short thick branchlets; calyx nearly 3 lin. deep, broader than long, shortly and densely tomentose, obsoletely sinuate-toothed, the anterior tooth a little produced; corolla glabrous, the standard  $\frac{1}{2}$  in. long or somewhat longer; ovary densely rusty-villous; pods oblong to linear-oblong (or if 1-seeded more or less oval), 2 to 6 in. long, acute, very thick-coriaceous and slightly sinuate between the 1-3 very large seeds, glabrous, brownish, lenticellate.

HAB.—Ava, Kakhyen hills.—Fl. Apr.

8. *M. monticola*, Kz.; H.f. Ind. Fl. ii. 106.—A large scandent leaf-shedding shrub, the shoots sparingly rusty-pubescent, glabrescent, the branches warted; young leaves (full-grown ones not seen) unpaired-pinnate; leaflets in 4-8 pairs with an odd one, petioluled, oblong, shortly acuminate, beneath on the nerves appressed tawny pubescent; flowers lazuli-blue, rather small, on 1-2 lin. long rusty-tomentose pedicels, clustered, and forming solitary 4-7 in. long shortly rusty tomentose racemes arising from above the scars of the fallen leaves; calyx sparingly rusty tomentose, 2-2 $\frac{1}{2}$  lin. deep, longer than broad, obsoletely and broadly toothed, the anterior tooth a little produced; corolla glabrous, the standard about  $\frac{1}{2}$  in. long; ovary thinly rusty-pubescent.

HAB.—Rather rare in the stunted hill and pine forests of the Nattoung at and near the top, at 6,500 to 7,200 ft. elevation.—Fl. March.—1.—SS. = Metam.

9. *M. coerulea*, Bak. in H.f. Ind. Fl. ii. 107.—A woody climber, with glabrous branches; leaflets 7, stipellate, obovate-oblong, on  $\frac{1}{2}$ - $\frac{1}{4}$  in. long petiolules, cuspidate, almost coriaceous, 4-6 in. long, glabrous; flowers very shortly pedicelled, densely fasciated, in close short-peduncled racemes in the axils of the leaves; calyx bell-shaped, a line long, faintly silky, nearly truncate; corolla 3 times longer than the calyx, the standard densely white-canescens on the back; stamens monadelphous; pods linear-oblong, 7-8 in. long by  $1\frac{1}{2}$ - $1\frac{3}{4}$  broad, flat, rather woody, recurved, densely brown-velvety-pubescent, tardily dehiscing.—(From Hooker's Ind. Flor.)

HAB.—Upper Tonasserim, at Phano.

10. *M. cana*, Bth. in H.f. Ind. Fl. ii. 105.—A climber, with grey-pubescent branches; leaf-rachis  $\frac{1}{2}$  ft. long, grey-pubescent; leaflets 7, without stipulets, oblong with the terminal one obovate,  $2\frac{1}{2}$ -3 in. long, rather blunt, glabrous and rather shining above, beneath thinly matted with appressed grey hairs, on  $\frac{1}{8}$  in. long petiolules; buds densely crowded, very shortly pedicelled; bracts lanceolate, silk-hairy, as long as the calyx; calyx minute, densely brown-silk-hairy, the teeth deltoid, half as long as the tube; standard glabrous; pod flat, rigidly coriaceous, obscurely grey-canescant, 2-3 in. long by  $\frac{3}{4}$ - $\frac{1}{8}$  broad, early dehiscent.—(After Hooker's Ind. Fl.)

HAB.—Ava.

11. *M. pulchra*, Kz.; H.f. Ind. Fl. ii. 104.—*Thit-pagān*.—A tree, probably leaf-shedding, the young shoots tawny pubescent; leaves unpaired-pinnate,  $\frac{1}{3}$ - $\frac{1}{2}$  ft. long, the young rachis tawny or coppery pubescent; stipulets subulate, longer persistent; leaflets in 7-10 pairs with a longer and jointedly petioluled odd one, oblong to oblong-lanceolate, on a puberulous glabrescent petiolule a line long, acute to shortly acuminate, 1-2 in. long, entire, membranous, turning chartaceous, beneath glaucescent and covered with a minute coppery or tawny appressed pubescence; flowers blue (?), on 2-3 lin. long tawny pubescent pedicels, clustered and forming tawny shortly pubescent 3-4 in. long racemes, arising solitary from the axils of the leaves of the young shoots or opposite to the terminal leaves; calyx nearly as broad as long, minutely appressed pubescent, about  $1\frac{1}{2}$  lin. deep, obsoletely sinuate-toothed; corolla glabrous, the standard nearly  $\frac{1}{2}$  an in. long; ovary densely silky pubescent; pods flat, linear-oblong, acuminate, coriaceous, almost torulose round the seeds, appressed puberulous.

HAB.—Ava hills.

12. *M. Brandisiana*, Kz.; H.f. Ind. Fl. ii. 108.—*Thit-pagan*.—A tree (40—60 + 15—30 + 4—6), leafless in H.S., all parts glabrous; the leaf-buds coppery or tawny pubescent; bark dark-grey, roughish; cut dry, reddish; leaves unpaired-pinnate,  $\frac{1}{2}$ -1 ft. long, the young rachis glabrous or nearly so, the stipulets subulate, longer persistent; leaflets in 7 to 10 pairs, with a longer and jointedly petioluled odd one, oblong-lanceolate to ovate-oblong, on a line long puberulous petiolule, bluntish acuminate,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, entire, while young membranous and slightly minutely pubescent beneath, afterwards rigidly but thinly coriaceous, glabrous and glaucous beneath; flowers steel-blue, rather large, on rather thick 2-3 lin. long glabrous pedicels, clustered, forming 4-8 in. long glabrous racemes along the young leafy or leafless shoots; calyx purple, glabrous, nearly as long as broad, about 2 lin. deep,

tomentose-fringed, the teeth conspicuous, the anterior one rather produced, the posterior ones short and broad-connate; corolla shortly silky pubescent, the standard nearly  $\frac{1}{2}$  an in. long; ovary appressed pubescent; pods obovate-oblong to oblong, usually more or less narrowed towards the base, very flat, firmly coriaceous, rather abruptly incurved-acuminate, 2-3 in. long, brown, smooth, 1-3-seeded, the sutures not thickened.

HAB.—Common in the upper mixed forests of the Pegu Yomah, rare in those of Prone.—Fl. March; Fr. Jan.-Febr.—L.—SS.—SIS.

REMARKS.—Wood white, soft, considered valueless.

13. *M. leucantha*, Kz.—*Theng-weng* or *thin-win*.—(*M. pendula*, Bak.; H.f. Ind. Fl. ii. 105.)—A leaf-shedding tree (53—60 + 15—25 + 5—6), the young shoots silky pubescent, glabrescent; leaves unpaired-pinnate,  $\frac{1}{2}$ – $\frac{3}{4}$  ft. long, while young thinly silk-hairy beneath, turning quite glabrous, the stipulets subulate, stiff, long-persistent; leaflets from ovate to elliptical, usually in 3 pairs with a longer jointedly petioluled odd one, shortly and rather abruptly acuminate, on a puberulous glabrescent petiolule about 2 lin. long, 3-4 in. long, rigidly chartaceous, entire, when full grown quite glabrous, pale-coloured beneath; flowers rather large, pure white, on 2-3 lin. long greyish velvety pedicels, clustered and forming a solitary greyish pubescent rather erect 3-4 in. long raceme at the end of the short lateral branchlets opposite the terminal leaf or occasionally laterally from young shoots; calyx nearly as long as broad, greyish velvety, about  $2\frac{1}{2}$  lin. deep, the 3 lower teeth distinct, rather acute, the upper 2 united in a broadly ovate single one; corolla glabrous, the standard nearly  $\frac{1}{2}$  in. long, entire; ovary appressed silky pubescent; pods woody, oblong to ovate-oblong, acute, glabrous, lenticellate, rough,  $1\frac{1}{2}$ –3 in. long, 1-3-seeded, the edges rounded, as in *Pongamia glabra*; seeds flat, brown.

HAB.—Frequent in the dry and open forests, less so in the upper mixed forests, all over Prone and the Pegu Yomah, up to 2,000 ft. elevation.—Fl. March-Apr.; Fr. Apr.-May.—L.—SS. = *CaS*. SIS. Lat., Dil.

REMARKS.—Heart-wood black, tough, but rather small; used for cross-pieces of harrows, etc.

14. *M. ovalifolia*, Kz.; H.f. Ind. Fl. ii. 107.—A tree (40—50 + 10—15 + 4—5), leafless in H.S., all parts quite glabrous; leaves unpaired-pinnate,  $\frac{1}{3}$ – $\frac{1}{2}$  ft. long, glabrous; leaflets ovate to elliptical and elliptically ovate, on a slender 1-2 lin. long petiolule, in 3 rarely 4 pairs, with a long and jointedly petioluled odd one, shortly acuminate, apiculate or rather bluntish,  $\frac{1}{2}$ –1 in. long, thin chartaceous, entire, somewhat glaucescent beneath, finely net-veined; flowers steel-blue, rather small, on a capillary 2-3 lin. long pedicel, solitary or almost clustered, forming slender, glabrous, 2-3 in. long racemes arising solitary or several from the short young

branchlets; calyx purple, glabrous, broader than long, about a line deep, obsoletely toothed or almost truncate; corolla glabrous, the standard about  $\frac{1}{2}$  in. long; ovary slightly appressed pubescent; pods linear-oblong, narrower towards the base, incurved-pointed, rather flat with rounded sutures, almost woody, pale-coloured, glabrous, covered with minute warts, 2-3 in. long, containing 2-3 seeds at about the middle.

HAB.—Frequent in the dry forests of Prome, and entering also the savannah forests.—Fl. Fr. March-Apr.—l.—SS.=CaS. All.

15. *M. glaucescens*, Kz.; H.f. Ind. Fl. ii. 107.—*Toung-kazaw*.—A tree (60—70 + 20—40 + 6—8), shedding leaves in H.S., all parts glabrous or usually the young shoots slightly greyish pubescent; bark rather smooth,  $\frac{1}{2}$  in. thick; cut yellowish; leaves unpaired-pinnate,  $\frac{1}{2}$ —1 ft. long, glabrous or the rachis and petiolules slightly puberulous; leaflets elliptical to obovate-oblong and oblong-lanceolate, in 4-3 or occasionally only in 2 pairs with a longer and jointedly petioluled odd one, bluntish and rather abruptly acuminate or apiculate, on a slender 2-3 lin. long glabrescent petiolule, 3-4 in. long, entire, membranous, glabrous or somewhat puberulous on the midrib beneath, glaucescent beneath; flowers rather small, blue, on capillary puberulous or almost glabrous 3-4 lin. long pedicels, forming slender, glabrous, or puberulous racemes solitary at the end of the lateral short branchlets or almost crowded along young shoots; calyx broader than long, sparingly pubescent, about 1-1 $\frac{1}{2}$  lin. deep, obsoletely and broadly toothed; corolla glabrous, the standard indistinctly notched, nearly  $\frac{1}{2}$  in. long; ovary appressed silk-hairy; pods oblong with a narrowed base, woody, incurved-pointed, flat, the sutures bordered with thick narrow wings turned upwards and therefore appearing almost 4-angular and winged, glabrous, sprinkled with corky fissured lenticels, 3-4 in. long and 2-3 lin. thick, 1-3-seeded.

HAB.—Common in the tropical and the moister upper mixed forests, especially along choungs, along the eastern slopes of the Pegu Yomah and in Martaban.—Fl. Apr.-May.; Fr. May-June.—s.—SS.=SiS. Metam.

REMARKS.—Wood yellowish, turning light-brown, coarsely fibrous, but brittle and rather hard.

16. *M. pubinervis*, Kz.; H.f. Ind. Fl. ii. 106.—A leaf-shedding tree (20—25+10—12 + 1—2), the young shoots puberulous; leaves unpaired-pinnate, about  $\frac{1}{2}$  a foot long, the rachis puberulous; leaflets elliptically to obovate-oblong, on a thin puberulous petiolule 1-2 lin. long, in 3 to 4 pairs with an odd one, rather long but bluntish acuminate, 2-3 in. long, thin chartaceous, entire, beneath glaucescent and pubescent on the midrib; flowers rather small, dirty yellowish white, on capillary pubescent pedicels, solitary or

clustered, forming a slender yellowish pubescent  $2\frac{1}{2}$ -3 in. long raceme arising solitary at the end of the branchlets opposite the leaf; calyx red, broader than long, about  $1\frac{1}{2}$  lin. deep, slightly pubescent, obsoletely sinuate-toothed; corolla glabrous, the standard more than  $\frac{1}{2}$  in. long; ovary appressed pubescent.

HAB.—Rather rare in the upper mixed forests of Marikhan, east of Tonkinhoon.—Fl. Apr.—l.—SS.=McLan.

REMARKS.—Wood white, coarsely fibrous, rather light, perishable.

17. *M. tetraptera*, Kz.; H.f. Ind. Fl. ii. 106.—A tree (40—50+15—20+5—6), shedding leaves in H.S., all softer parts shortly and softly pubescent; leaves unpaired-pinnate,  $\frac{1}{2}$ -3 ft. long, while young softly and shortly tomentose; leaflets in 3 (rarely 2 or 1) pairs with a longer jointedly-petiololed odd one, obovate to elliptically-obovate, on a strong 1-2 lin. long tomentose petiole, rounded or almost notched or rarely apiculate, 1-3 in. long and nearly as broad, entire, while young membranous and shortly greyish tomentose on both sides, finally rigidly chartaceous and glabrous above; flowers rather small, but showy, very pale lilac, on 2-3 lin. long densely pubescent pedicels, clustered and forming 3-4 in. long tawny or yellowish tomentose racemes along the young leafy shoots and terminal opposite the end-leaf; calyx broader than long, tomentose, about  $1\frac{1}{2}$  lin. deep, obsoletely sinuate-toothed or almost truncate; corolla glabrous, the standard about  $\frac{1}{2}$  in. long; ovary appressed pubescent; pods almost emarginate-oblong, narrowed into a sterile base, woody, incurved-pointed, 3-4 in. long, pale-coloured and smooth, the borders turned upwards into irregular thick woody waved wings, and thus the pod almost 4-winged, containing 1 or 2 seeds at the upper half.

HAB.—Frequent in the dry forests, especially the mixed ones, of Prome and Ava.—Fl. Apr.—l.—SS.=CaS.

18. *M. atropurpurea*, Bth.; H.f. Ind. Fl. ii. 108.—*Kray-tanyeng* or *tanyeng-nee*.—An evergreen tree (50—60+15—30+5—6), the leaf-buds whitish tomentose; bark about 3 lin. thick, grey, smooth, peeling off in thin small flakes; cut brown, with blood-red sap-wood exuding red resin; leaves unpaired-pinnate, glabrous, 1-1 $\frac{1}{2}$  ft. long; leaflets in 3-4 pairs with a long jointedly petioleled odd one, ovate-oblong to oblong, on a thick 3-4 lin. long petiole, shortly acuminate or apiculate, 3-5 in. long, entire, thin coriaceous, glossy; flowers rather large, bluish purple with a yellow blotch at the base of the standard, on very short pubescent pedicels or almost sessile, spiked or racemose, and forming a robust pale-coloured shortly pubescent panicle at the end of the branches; calyx smooth, purple, 2-3 lin. deep, oblique, obsoletely sinuate-toothed, the posterior tooth more developed; corolla glabrous, the standard nearly  $\frac{1}{2}$  an in. long;

ovary glabrous; pods coriaceous, purplish black, smooth, 2-4 in. long, obliquely obovate to oblong and torose, acute, containing 1 or 2 large elliptically oblong black seeds.

HAB.—Rather frequent in the tropical forests along the eastern and southern slopes of the Pegu Yomah and from Martaban down to Tenasserim.—Fl. Jan.-March; Fr. May-June.—s.—SS.—*Metam. Lat. p. SiS.*

REMARKS.—Wood pale-coloured, turning brownish, rather heavy, coarsely fibrous and rather loose-grained, soon attacked by xylophages. Yields a red resin.

## INDIGOFERA, L.

Calyx small, broad and oblique, the teeth or lobes almost equal, or the lower longer. Standard ovate or orbicular, sessile or constricted in a claw; wings oblong; keel-petals slightly cohering to the wings, erect, blunt or acuminate, at both sides laterally gibbous or spurred. Staminal tube thin, long-persistent, the vexillar stamen free from the base; anthers conform, the connective gland-like apiculate. Ovary sessile or nearly so, with 1 or 2 or more ovules; style glabrous, the capitate stigma often penicillate. Pod various, from globular to linear, septate within between the seeds. Seeds without strophiole, the radicle often club-shaped.—Herbs, shrubs; or rarely trees, with simple or digitate or pinnate leaves. Stipules small and almost adnate to the petiole; stipulets sometimes present. Flowers in axillary racemes or spikes. Bracts present or none.

\* *Calyx deeply cleft, the lobes subulate-acuminate. Corolla about twice as long as the calyx (all herbs or undershrubs).*

\* \* *Calyx toothed, the teeth short, more or less acute. Corolla at least 3 times as long as the calyx, but usually much longer (shrubs, rarely trees).*

× Leaves simple or 3-foliolate.

Whole plant greyish from minute appressed stiff hairs; leaves 1-3 foliolate on the same plant; stipules very minute . . . *I. Brunoniana.*

Pubescence soft, tawny; leaves 1-foliolate; stipules about 2 lin. long . . . *I. caloneura.*

× × Leaves unpaired-pinnate.

○ Pods more or less 4-cornered, 1½-2 in. long; seeds cubical or 4-gonous.

Stipules 2-3 lin. long; pods minutely appressed pubescent . . . *I. galeoides.*

Stipules minute, pods glabrous . . . *I. pulchella.*

○ ○ Pods terete, about an inch long, glabrous; seeds cylindrical; stipules minute . . . *I. elliptica.*

1. *I. Brunoniana*, Grah.; H.f. Ind. Fl. ii. 93.—*Toung-mai-sain*.—An erect branched shrub or undershrub, 1-3 ft. high, all parts greyish from short stiff appressed hairs; stipules subulate, very minute; leaves 1- (or the lower ones occasionally pinnately 3-) -foliolate, on a canescent ½-1 in. long petiole; leaflets oblong to elliptically

oval, on a very short subulate-stipellate petiolule, rounded at the base, 1-4 in. long, blunt or rounded with a bristly point, membranous, on both sides thinly and shortly appressed stiff-hairy, beneath canescent; flowers middling-sized, rose-coloured, on short slender canescent pedicels subtended by a subulate bract, forming a longer or shorter peduncled many-flowered canescent raceme of the length of the leaves or somewhat longer; calyx short and broad, about a line deep, the teeth 3-angular, short; corolla nearly  $\frac{1}{2}$  an in. long; pods linear, about  $1\frac{1}{2}$  in. long, bluntish, 4-cornered, the apex turned upwards and conically acute, shortly appressed hispid, containing numerous dark-brown 4-cornered oblong seeds.

HAB.—Not unfrequent in the Eng forests of Prome, Pegu, and Martaban.—Fl. close of R.S.; Fr. C.S.—L.—SS.—Lat.

2. *I. caloneura*, Kz; H.f. Ind. Fl. ii. 93.—An erect, branched shrub, all parts shortly but softly tawny pubescent; stipules about 2 lin. long, linear-subulate, densely pubescent; leaves 1-foliolate, on a strong densely tawny pubescent petiole 3-4 lin. long; leaflets more or less elliptical, on a thick very short petiolule, rounded at both ends or retuse at the apex, mucronulate, 3-4 in. long, entire, chartaceous, glabrous above, beneath softly pubescent and glaucescent, the midrib, nerves, and veins strongly prominent and tawny pubescent; flowers rose-coloured (?), rather small, on 2 lin. long filiform puberulous pedicels subtended by a subulate rather long bract, forming a strong, pubescent, many-flowered raceme in the axils of the leaves and usually shorter than them; calyx short, but wide, hardly a line deep, the teeth 3-angular, acute; corolla about  $\frac{1}{3}$  in. long; ovary densely silky pubescent.

HAB.—Pegu.

3. *I. galegoides*, DC.; H.f. Ind. Fl. ii. 100.—*Taw-mai-yain*.—A large meagre shrub, sometimes growing out in a small tree 12-15 ft. high, the stem about an inch thick, the branches angular-lined, the shoots appressed pubescent; stipules filiform, 2-3 lin. long, deciduous; stipulets very minute subulate; leaves unpaired-pinnate, rather shortly petioled,  $\frac{1}{3}$ - $\frac{1}{2}$  ft. long; leaflets in 7-10 pairs with a longer petioluled odd one, obovate-oblong to elliptical, on a line long slender petiolule, obtuse at the base,  $\frac{1}{2}$  to 1 in. long, rounded with a minute mucro, entire, membranous, thinly and shortly appressed pubescent on both sides, glaucescent beneath; flowers white with purple keel, middling-sized, on puberulous 1-1 $\frac{1}{2}$  lin. long pedicels subtended by a minute subulate bract, forming a rather robust, many-flowered, slightly pubescent axillary raceme much shorter than the leaves; calyx short, but wide, hardly a line deep, canescent, the teeth short, 3-angular, acute; corolla about  $\frac{1}{3}$  in. long; pods linear, somewhat compressed 4-cornered,  $1\frac{1}{2}$  to 2 in. long, acuminate.

minutely appressed pubescent, blackish, containing many dark-brown 4-cornered oblong seeds.

IIAB.—Not unfrequent in the open forests, ascending into the hill Eng forests, up to 3,000 ft. elevation, from Martaban to Tenasserim; also above Rangoon.—Fl. R.S.; Fr. C.S.—SS.—Lat. Metam. Arg.

4. *I. pulchella*, Roxb.; H.f. Ind. Fl. ii. 101; Bedd. Sylv. Madr. 85, t. 12, f. 1.; Brand. For. Fl. 136.—*Taw-mai-yain*.—A stout, branched shrub, sometimes growing out in a small tree with a short thick trunk, the shoots thinly pubescent; stipules subulate, very deciduous; leaves unpaired-pinnate, short-petioled, 3-6 in. long; leaflets in 8-12 pairs with an odd one, elliptical to oval-oblong, on a slender puberulous petiolule 1-1½ lin. long, rounded or blunt with a mucro, ½-¾ in. long, rarely longer, entire, firmly chartaceous, on both sides thinly and minutely appressed pubescent, beneath glaucescent; flowers middling-sized, rose-coloured, on short canescent pedicels, forming a short, canescent, sessile, many-flowered raceme in the axils of the leaves and shorter than them; bracts linear-lanceolate, acuminate, canescent, very deciduous; calyx canescent, short, but wide, about a line deep, the teeth 3-angular-acuminate; corolla about ½ in. long; pods linear, almost 4-cornered, 1½-2 in. long, straight, with the conical point straight or conspicuously turned upwards, glabrous, brown, containing many cubical dark-brown seeds.

IIAN.—Not unfrequent in the dry and open, especially the Eng forests, from Ava and Prome down to Pegu and Martaban.—Fl. Fr. C. and H.S.—L.—SS.—Dil. CaS. Aren.

5. *I. elliptica*, Roxb.—An erect, stout, branched shrub, the shoots thinly and shortly appressed pubescent; stipules subulate, minute; leaves unpaired-pinnate, shortly petioled, 3-6 in. long; leaflets in 4 to 8 pairs with a longer petioluled odd one, elliptical to obovate, on a line long pubescent filiform petiolule, ½-1 in. long, rounded or rarely retuse with a mucro, entire, thin-membranous, on both sides very thinly and minutely appressed pubescent, pale-coloured or almost glaucescent beneath; flowers middling-sized, rose-coloured, on short canescent pedicels, forming a short, sessile, many-flowered greyish-pubescent raceme in the axils of the leaves and much shorter than them; bracts lanceolate, hoary, very deciduous; calyx about a line long, appressed pubescent, the teeth 3-angular, acute; corolla about ½ in. long; pods linear, obliquely acute, about an inch long, almost terete with pale-coloured prominent sutures, brown, glabrous, containing 6-10 blackish cylindrically oblong truncate seeds.

IIAB.—Pegu, above Rangoon; and from Martaban down to Tenasserim.—Fr. C.S. —

## SESBANIA, Pers.

Calyx-tube broad, truncate, or the teeth or lobes nearly-equal. Standard orbicular or ovate, spreading or reflexed; keel incurved, blunt or acuminate, the claws much longer than those of the other petals. Upper stamen free, geniculate near the base, the others united in a sheath, angular at base; anthers uniform or nearly so. Ovary with several ovules; style glabrous, with a small terminal stigma. Pod long and linear or nearly oblong, 2-valved or indehiscent, the endocarp continuous with spurious transverse partitions separating the seeds. Seeds not strophiolate.—Herbs or shrubs, rarely trees, with abruptly pinnate leaves. Stipules setaceous, very deciduous; stipulets minute or none. Flowers large or middling-sized in axillary racemes. Bracts and bractlets very rarely persistent during flowering.

× Flowers 2-3 in. long; standard acute or bluntish; small tree . . . *S. grandiflora*.

× × Flowers less than an inch long; standard broad, more or less notched.

○ Racemes drooping from the base already; small tree . *S. Ægyptiaca*.

○ ○ Racemes erect from the base, but often overhanging. Shrubby annuals

Pods rather convex on both sides,  $1\frac{1}{2}$ -2 lin. broad; standard  $\frac{1}{2}$  an in. long; seeds cylindrical . . . *S. aculeata*.

Pods rather flat, 2-3 lin. broad, with a narrow border; standard  $\frac{2}{3}$  in. long; seeds more or less compressed-rhomboid . . . *S. cochinchinensis*.

1. *S. grandiflora*, Pers.; H.f. Ind. Fl. ii. 115; Bedd. Sylv. Madr. 86; Brand. For. Fl. 137.—*Ponk-pan* or *ponk-hpyoo*.—An evergreen tree ( $15-25+8-9+1-2$ ), all parts glabrous; leaves abruptly pinnate, about  $\frac{1}{2}$  a foot long or longer, glabrous and somewhat glaucous-green; leaflets in 15-5 pairs, more or less opposite, oblong or elliptical, blunt or almost notched and often mucronulate, on a slender 1 lin. long petiolule,  $1-1\frac{1}{2}$  in. long, entire, membranous; flowers large and showy, scarlet, white or variegated, on  $\frac{1}{2}$ -1 in. long glabrous pedicels, forming a very short 2-5-flowered glabrous raceme in the axils of the leaves; calyx glabrous, about  $\frac{1}{2}$  an in. deep or deeper, shortly and broadly toothed; standard  $2-2\frac{1}{2}$  in. long, ovate, rather shorter than the other petals; keel much incurved, ending in a blunt beak; pods  $1-1\frac{1}{2}$  ft. long, linear, beaked, narrow and sterile at the base, rather flat and somewhat 4-cornered, glabrous; seeds pale-coloured.

HAB.—Cultivated all over Burma, and adjacent provinces and islands, in villages, native gardens, etc.—Fl. R.S.—SS.=∞.

2. *S. Ægyptiaca*, Pers.; H.f. Ind. Fl. ii. 114; Bedd. Sylv. Madr. 86, t. 12, f. 3.; Brand. For. Fl. 137.—*Yay-lha-kyee*.—An evergreen ( $20-25+8-10+3-2\frac{1}{2}$ ), all parts glabrous; leaves 3-4

in. long, abruptly pinnate and bristly terminated, glaucous-green; leaflets in 7-18 pairs, oblong to linear-oblong, blunt, with or without a minute mucro,  $\frac{1}{4}$ - $\frac{3}{4}$  rarely 1 in. long, on a very short thin petiolule or almost sessile, entire, membranous; flowers rather small, yellow or yellow and purple mottled, or the standard purple outside, on capillary 2-4 lin. long pedicels, forming a nodding, slender, loose raceme in the axils of the leaves and shorter than them; bracts and bractlets very deciduous; calyx broader than long, about 2-3 lin. deep, glabrous, conspicuously 5-nerved, the teeth broad, acute; standard nearly  $\frac{1}{2}$  an in. long, very broad and notched; keel much incurved, broad, blunt, with an acute basal angle; pods narrow-linear and often curved, 4-8 in. long,  $1\frac{1}{2}$ -2 lin. broad, sharply beaked, glabrous, convex and often somewhat tumid; seeds pale-brown.

HAB.—Generally cultivated with the natives all over Burma.—Fl. Fr. Jan.-May.—SS.=∞.

REMARKS.—Wood white, soft, light, fibrous, but rather close-grained. Said to furnish the best charcoal for gunpowder; good for children's toys, etc.

### PRIOTROPIS, WA.

Calyx-lobes almost equal, free. Standard almost orbicular, with 2 callosities at the short claw, the wings obovate, shorter than the standard, the keel beaked. Stamens all united in a sheath slit on the back; anthers dimorphous, the small versatile ones alternating with the long basifix ones. Ovary stalked, with many ovules, the style much incurved, longitudinally bearded along the inner side towards the terminal stigma. Pod stalked, oblong, much compressed, 2-valved, continuous within. Seeds on filiform funicles.—Shrubs, with 3-foliolate leaves and yellow racemose flowers.

1. *P. cytisoides*, WA.—An erect, branched shrub, 4 to 6 ft. high, the branches and shoots minutely appressed pubescent; stipules minute, subulate; leaves 3-foliolate, on an 1-1 $\frac{1}{2}$  in. long petiole; leaflets more or less lanceolate, acute at the base, on a very short pubescent petiolule, acuminate or acute with a mucro, 1-2 in. long, entire, membranous, glabrous above, beneath glaucescent and sparingly minutely appressed pubescent; flowers middling-sized, yellow, on slender pubescent 2-3 lin. long pedicels subtended by a reflexed linear-acuminate small bract, forming leaf-opposed and lateral almost sessile slightly pubescent racemes; calyx about 3-4 lin. long, minutely appressed pubescent, the lobes lanceolate, acuminate; corolla much larger; pods much compressed, obliquely oblong, at the unequal base contracted in a slender about 3 lin. long stalk, stylose-acuminate, glabrous, about 1-1 $\frac{1}{4}$  in. long, containing 1-3 pale-brown glossy seeds.

HAB.—Ava hills and Tenasserim.—Fl. Fr. ∞.

## BUTEA, Roxb.

Calyx ample, the teeth or lobes short, the 2 upper ones united in a broad entire or notched lip. Standard ovate to orbicular, acute or blunt, recurved, without appendages; wings oblique or falcate, free or adhering to the keel; keel much incurved, acute or blunt, as long or shorter than the standard. Stamens diadelphous, the vexillary one free; anthers conform. Ovary sessile or stalked, with 2 ovules; style elongate, incurved, beardless, the stigma terminal, minute or truncate. Pod almost sessile or stalked, oblong or broadly linear, coriaceous, indehiscent, the lower sterile part wing-like dilated. Seed solitary, compressed, at or near the summit of the pod.—Trees or woody climbers, with pinnately 3-foliate leaves. Stipules small, deciduous; stipulets present. Flowers large or small, in racemes or panicles. Bracts and bractlets narrow, deciduous.

× Corolla scarlet, an inch long or longer, silky pubescent.

Keel and standard more or less acute.

○ Pod sessile; erect shrub . . . . . *B. minor*.

○○ Pod stalked.

Erect tree; pedicels twice the length of the calyx . . . . . *B. frondosa*.

Woody climber; pedicels 3 times the length of the calyx . . . . . *B. superba*.

× × Corolla less than  $\frac{1}{2}$  in. long, white, glabrous. Keel  
and standard more or less blunt. Climbers.

Leaves large, silvery silk-hairy beneath; pod stalked . . . . . *B. parviflora*.

Leaves small, glabrous to the naked eye; pod sessile . . . . . *B. acuminata*.

1. *B. frondosa*, Roxb.; H.f. Ind. Fl. ii. 194; Bedd. Sylv. Madr. t. 176; Brand. For. Fl. 142.—*Pouk-pen*.—A tree (30—50 + 6—10 + 6—8), leafless during H.S., the young shoots silky pubescent; leaves pinnately 3-foliate, on a 3-4 in. long petiole, while young appressed greyish pubescent; leaflets on a strong pubescent glabrescent petiolule 2 lin. long, the terminal one broadly obovate, the lateral ones unequally ovate, blunt or bluntish, mucronate, 3-5 in. long, entire, when full grown rigidly chartaceous, above glabrous or nearly so, beneath greyish puberulous or shortly and thinly tomentose, the net-veination copious and strong; flowers large and showy, orange-scarlet, on  $\frac{1}{2}$ -1 in. long tawny tomentose pedicels, clustered and arranged into tomentose robust racemes arising from short often tubercle-like branchlets or young shoots; calyx rusty velvety-tomentose, broader than deep, about  $\frac{1}{2}$  an in. across; corolla nearly  $1\frac{1}{2}$  in. long, silky pubescent; ovary villous; pods oblong, often a little falcate, appressed silvery pubescent, 3-4 in. long, blunt or nearly so, on  $\frac{1}{2}$  an in. long stalk.

HAB.—Common in all leaf-shedding forests, especially in the savannah forests, all over Burma from Chittagong, Ava, and Martaban down to Tenasserim.—Fl. March-Apr.; Fr. Apr-May.—l.—SS.=∞.

REMARKS.—Wood white, rather light and rather strong. Little used besides for common house-building purposes. Yields a red, brittle, clear resin, a sort of gum-kino of commerce. Superior lac is found on the tree.

2. *B. superba*, Roxb.; H.f. Ind. Fl. ii. 195; Brand. For. Fl. 143.—*Pouk-nway*.—A large woody leaf-shedding climber, the young shoots silky pubescent; leaves pinnately 3-foliolate, on a 3-4 in. long petiole, while young greyish pubescent; leaflets on a thick 1-2 lin. long petiolule, the terminal one broadly obovate, the lateral ones obliquely oval, blunt or rounded, 4-8 in. long, entire, chartaceous, when full grown glabrous above and minutely pubescent beneath, the net-veination strong and prominent; flowers large and showy, scarlet, on 1-1½ in. long rusty-tomentose pedicels, clustered and forming shorter or longer robust tomentose racemes arising from short branchlets above the scars of the fallen leaves; calyx while young more cylindrical than in the preceding species, afterwards broader than deep, nearly ½ an in. across, tawny or rusty velvety-tomentose; corolla silky-pubescent outside, nearly 1½ in. long; ovary tomentose; pod oblong, silvery silk-hairy, 3-4 in. long.

HAB.—Frequent in all mixed forests all over Burma from Pegu and Martaban down to Upper Tenasserim.—Fl. March-Apr.; Fr. May-June.—l.—SS.=∞ SiS.

3. *B. parviflora*, Roxb. (*Spatholobus Roxburghii*, Bth.; Brand. For. Fl. 143; H.f. Ind. Fl. ii. 193).—*Pouk-nway*.—A large woody climber, leafless in H.S., the stem as thick as a man's leg and much fluted, the younger parts appressed silk-hairy; leaves pinnately 3-foliolate, on a 2-3 in. long glabrescent petiole; leaflets large, on a thick 2-3 lin. long petiolule, ovate to ovate-oblong, the lateral ones very unequally so, 5-6 in. long, apiculate to bluntish, almost coriaceous, glabrous above, beneath densely and almost silvery puberulous; flowers small, white, on strong about a line long pedicels, usually by pairs, racemose, and forming larger or smaller greyish or yellowish tomentose panicles in the axils of the upper leaves or at the end of the branches; calyx more than 3 lin. long, minutely tawny or whitish tomentose, the lobes triangular-lanceolate; corolla about 3 lin. long, glabrous; pods rusty or tawny tomentose, on nearly an in. long stalk, oblong, 3-4 in. long, the wing-like sterile part rounded and waved, the outer suture straight and thickened.

HAB.—Common in all mixed forests, especially the upper ones entering also the tropical forests, from Chittagong, Pegu, and Martaban down to Tenasserim.—Fl. Febr.-Apr.; Fr. D.S.—l. and s: l. SS.=∞.

4. *B. acuminata*, Wall. (*Spatholobus acuminatus*, Bth.; H.f. Ind. Fl. ii. 194).—A large woody leaf-shedding climber, the stem as thick as an arm, the shoots slightly appressed pubescent; leaves

pinnately 3-foliolate, on a slender  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long glabrescent petiole; leaflets more or less oblong to elliptically oblong, on a 2 lin. long pubescent petiolule, longer or shorter and abruptly acuminate,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, chartaceous, glabrous and glossy above, beneath, especially on the midrib, minutely and sparingly appressed puberulous or almost glabrous; flowers small, white, on slender 2-3 lin. long puberulous pedicels, fasciated-racemose and forming small slender greyish puberulous almost sessile panicles above the scars of the fallen leaves; calyx about 2 lin. long, puberulous, the lobes broad and blunt; pods sessile, tawny puberulous, especially along the thickened straight outer suture, oblong to linear-oblong, rounded at the base, 2 to nearly 3 in. long.

HAB.—Frequent in the tropical forests all over Pegu and Martaban down to Tenasserim.—Fl. Fr. H.S.—s: L—SS.—SiS.—Metam.

### ERYTHRINA, L.

Calyx bell-shaped or cylindrical, obliquely truncate or slit on the back, entire or toothed. Standard broad or long, erect or recurved, narrowed and without appendages at the base; wings short, minute, or none; keel short, the petals united or not. Stamens all united at the base, the vexillar one often free from the middle; anthers reniform. Ovary stalked, with several ovules; style subulate, with a small stigma. Pod stalked, linear-falcate or flat and dilated at the sterile base, often more or less contracted between the seeds, dehiscing along one or both sutures, the endocarp often pithy. Seeds not strophiolate.—Trees or rarely shrubs or tall herbs, often prickly armed, with 3-foliolate leaves, the leaflets entire to 3-lobed. Stipules small; stipulets usually gland-like. Flowers large and showy, in clusters of 2-3 from lateral nodes and forming terminal or axillary racemes. Bracts small or none.

\* *Wings much longer than the calyx.*

○ Seeds 1-3, at the end of the wing-like dilated 2-valved sterile part of the buten-shaped pod.

Standard minutely velvety; keel-petals free at the base and at the summit

*E. holosericea.*

Standard glabrous; keel-petals connate, obcordate and shortly acuminate in the sinus; pod on a 1-2 in. long stalk

*E. lithosperma.*

○○ Pods greyish-velvety, fertile from the base.

Pod flat, torulose, opening along the sinuate outer suture, the dorsal suture prominent and straight; seeds free, but usually separated by spurious spongy septa; glabrous, glaucous

*E. ovalifolia.*

Pods torulose or almost moniliform, dehiscing at both sutures; seeds enclosed in the continuous pithy-chartaceous indehiscent endocarp

*E. Indica.*

\* \* *Wings minute, as long or shorter than the calyx. Pods foliolo-like, opening along the ventral suture. Seeds free.*

- Leaflets glabrous, acuminate; calyx spathaceous . . . . . *E. stricta*.  
 Leaflets more or less pubescent or puberulous beneath, blunt;  
 calyx 2-lobed, spathaceous . . . . . *E. suberosa*.

1. *E. holosericea*, Kz.—A leaf-shedding tree, armed with short black sharp prickles, the young shoots mealy-puberulous; leaves 3-foliolate, on a 3-4 in. long petiole, glabrous, exactly agreeing with those of the following species, the stipulary glands large; leaflets more or less ovate, on a 2-3 lin. long petiolule, acuminate, 3-5 in. long, entire, chartaceous or membranous; flowers large, apparently scarlet with purple wings and keel, almost sessile, by 2-3 clustered and forming a tawny mealy-tomentose raceme; calyx shortly resupinate-spathaceous, brown-villous, tawny-silky within, 4-5 lin. long; standard nearly  $1\frac{1}{2}$  in. long, obovate-cuneate, blunt, minutely velvety, the wings falcate-oblong, blunt, about  $\frac{1}{2}$  as long, the keel about  $\frac{3}{4}$  in. long, consisting of 2 obliquely oblong rather acute shortly clawed petals united along the median part and hence appearing 2-lobed; ovary shortly tawny villous.

HAB.—Pegu, Tharrawaddi district.

2. *E. lithosperma*, Miq.; H.f. Ind. Fl. ii. 190.—*Yea-kathit*.—A tree (50—60 + 20—30 + 4—6), leafless in H.S., the trunk and branches armed with short sharp prickles arising from pustules, the very young shoots mealy-puberulous; leaves 3-foliolate, on a 3-5 in. long petiole, the stipulary glands large; leaflets more or less ovate, the lateral ones somewhat obliquely so, on a strong 3-4 lin. long petiolule, acuminate, 4-5 in. long, entire, chartaceous, glabrous, pale-coloured beneath; flowers rather large, scarlet, with whitish wings and keel, almost sessile, clustered by 2-3 and forming a mealy-tomentose raceme arising from the axils of the upper young leaves at the end of the branchlets; calyx ample, tawny-velvety tomentose outside, silvery silky inside, 2-lobed, about 4 lin. long or somewhat longer; standard elliptically oblong with a short tapering base, blunt,  $1-1\frac{1}{4}$  in. long, glabrous; keel about  $\frac{1}{2}$  as long, obversely and broadly cordate with a short acumen in the sinus; wings as long as the keel, narrowly cuneate-obovate; pods on a 1-2 in. long stalk, 4-5 in. long, chartaceous, glabrous, much flattened and dilated at the lower sterile half, the upper contracted part bearing 1-3 seeds, subulate-acuminate; seeds free, large, purplish brown.

HAB.—Common along streams in the hill savannah and upper mixed forests all over Pegu and Martaban.—Fl. Jan.-Febr.; Fr. March-Apr.—s.xl.—SS.—Metam. *Sis*.

REMARKS.—Wood soft, yellowish.

3. *E. ovalifolia*, Roxb.; H.f. Ind. Fl. ii. 189; Bedd. Sylv. Madr. 88.—*Kone-kathit*.—A tree (40—50 + 15—20 + 3—4),

leaves in H.S., the trunk and branches armed with sharp prickles arising from compressed woody tubercles, all parts glabrous; bark thin, covered with a brown membrane; cut greenish; leaves 3-foliate, on a 2-3 in. long petiole, glabrous, the stipulary glands rather large, orbicular; leaflets oval to oblong-oval, on a strong 2-3 lin. long petiolule, blunt or bluntish,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. long, entire, chartaceous, glabrous, glaucous beneath; flowers rather large, dull-purple, with the keel and wing bases greenish yellow, on 4-6 lin. long strong mealy-tomentose pedicels, by 2-3 clustered or solitary and collected in a robust tawny or greyish tomentose raceme arising at and near the end of the branchlets; calyx tawny velvety, shortly and reflexed-spathaceous, nearly  $\frac{1}{2}$  an in. long; standard broadly obovate, narrowed at the base, somewhat notched, about  $1\frac{1}{2}$  in. long; wings obovate-oblong,  $\frac{1}{2}$  in. long; keel nearly  $\frac{3}{4}$  in. long; ovary tawny pubescent; pods about  $\frac{1}{2}$  ft. long, torulose, sinuate along the outer border, incurved-acuminate, indistinctly greyish puberulous, the inner suture strongly prominent; seeds oblong, purplish black, free, often separated by medullary septa.

HAB.—Common in the tidal forests and tidal savannahs, also in the beach jungles, of Chittagong, Aracan, and Lower Pegu; also met with in Tounghoo district along the Khuhoung chg. near villages, here cultivated (?)—Fl. Febr.-March.—L.—SS.—All. Sal. Aren.

REMARKS.—Wood white, light, very coarse and fibrous.

4. *E. Indica*, Lamk.; H.f. Ind. Fl. ii. 188; Bedd. Sylv. Madr. 87; Brand. For. Fl. 130.—*Penglay-kathit*.—A tree (50—60+10—15+5—0), leafless during H.S., the trunk and branches armed with short sharp prickles arising from woody tubercles, the very young shoots more or less mealy-puberulous; leaves 3-foliate, on a 2-3 in. long petiole, the stipulary gland round, rather large; leaflets broadly ovate, the lateral ones somewhat obliquely so, on a 2-3 lin. long puberous glabrescent petiolule, 2-3 in. long and broad, bluntish acuminate, entire, membranous, glabrous, green; flowers rather large, purplish scarlet, on strong mealy-puberulous 2-4 lin. long pedicels, by 2-3 clustered and forming one or several lateral, stiff, strong, mealy-pubescent racemes at the end of the leafless thick branchlets; calyx spathaceous, fully  $\frac{3}{4}$  in. long, glabrous, incrassately truncate at the tip, while young terminated by 2 subulate appendages; standard ovate-lanceolate, narrowed at the base, acute, nearly  $1\frac{1}{2}$  in. long; wings and keel obovate, only  $\frac{1}{2}$  an in. long; ovary tawny tomentose; pods  $\frac{1}{2}$ -1 ft. long, much curved and torulose, or by abortion of seeds almost moniliform, thin coriaceous, glabrous; seeds large, reddish or purplish, all enclosed in the continuous medullary-papery endocarp.

HAB.—Frequent in the beach forests along the shores from Chittagong down to Tonasserim and the Andamans.—Fl. March; Fr. June-Sept.—L.—SS.—Aren All. Sal.

REMARKS.—Wood soft and white, loose-grained, very light, soon attacked by xylophages. It is the *muchi* wood of Madras, employed for children's toys, boxes, etc. Said to yield lac.

NOTE.—Strange enough, this sea-shore tree scantily re-occurs in the dry forests of the Prome district. I have not examined the respective localities, but suspect that there are brine wells or limestone in the vicinity.

5. *E. stricta*, Roxb.; H.f. Ind. Fl. ii. 189; Bedd. Sylv. Madr. t. 175.—*Young-kathit*.—A tree (40—60 + 15—25 + 4—5), leafless during H.S., the trunk and branches armed with sharp prickles arising from woody lamellate tubercles, the young shoots minutely puberulous; leaves 3-foliolate, on a 2-4 in. long petiole, the stipulary glands rather small; leaflets broadly ovate, the lateral ones somewhat obliquely so, on a 2-3 lin. long petiolule, bluntish acuminate, 2-4 in. long and broad, entire, membranous, glabrous or indistinctly puberulous and glaucous beneath; flowers scarlet, with the wings and keel whitish, rather large, on rather thick 3-4 lin. long puberulous pedicels, by 2-3 clustered and forming tawny, mealy-pubescent, glabrescent, robust racemes arising usually several together at the end of the thick leafless branchlets; calyx glabrous, resupinate-spathaceous, 4-5 lin. long, at the base constricted in a conical tube, almost acute; standard linear-lanceolate with a short narrowed base, bluntish, about 1½ in. long; keel ovate-lanceolate, half as long; wings about 2 lin. long, falcate-lanceolate, acuminate; pods follicular-lanceolate, 2½-3 in. long, chartaceous, glabrous, acuminate at both ends; seeds free, 1-3, brown.

HAB.—Frequent in the upper mixed forests of the Pegu Yomah and Prome, rare in Martaban, up to 2,000 ft. elevation.—Fl. March-Apr.; Fr. May-June.—l.—SS.—SiS. Metam.

REMARKS.—Wood white, soft.

6. *E. suberosa*, Roxb.; H.f. Ind. Fl. ii. 189; Bedd. Sylv. Madr. 87; Brand. For. Fl. 140.—A tree (40—50 + 20—30 + 3—6), shedding leaves in H.S., the branchlets sparingly armed with short sharp prickles, the young shoots mealy-tomentose; bark very thick, quite uneven and deeply longitudinally cracked, pale-coloured, the cracks laminate; leaves 3-foliolate, on a glabrescent 4-5 in. long petiole, the stipulary glands conspicuous; leaflets ample, 4-7 in. broad, and the terminal rounded one usually shorter than broad, broadly ovate, the lateral ones somewhat obliquely so, sinuate-truncate at the base, on a strong petiolule 3-4 lin. long, blunt, entire, chartaceous, beneath glaucous and minutely appressed puberulous or pubescent, the net-veination strongly prominent; flowers scarlet, rather large, on 3-4 lin. long floccose-mealy pedicels, solitary or almost clustered, forming several tawny, mealy-tomentose, robust racemes at the end of the leafless branchlets; calyx ample, 4-5 lin. long, slightly mealy outside, silvery silky inside, glabrescent, at the base constricted

in a conical short tube, 2-lobed, the lobes broad, somewhat acute, or the posterior broader one sometimes shortly 2-cleft; standard linear-lanceolate, bluntish, shortly tapering at the base, about  $1\frac{1}{4}$  in. long; keel  $\frac{1}{2}$  an in. long, ovate, acute; wings  $2-2\frac{1}{2}$  lin. long, rhomboid-cuneate, acute, almost cohering; ovary tawny-villous; pods 3 in. long, follicular-lanceolate, at both ends acuminate, glabrous; seeds 2-3, free, pale-brown.

HAB.—Not unfrequent in the drier upper mixed forests of the Pegu Yomah, up to 2,000 ft. elevation.—Fl. March-Apr.—1.—SS.—SiS.

### FLEMINGIA, Roxb.

Calyx-lobes almost equal or the lowermost longer, free, often falcate. Standard ovate to orbicular, at the base furnished with inflexed auricles; wings obliquely obovate or oblong, sometimes adhering to the rather straight or incurved acute or blunt keel. Stamens united in a sheath, the vexillar one free; anthers uniform. Ovary sessile or nearly so, with 2 ovules; style filiform or slightly thickened at the apex, with a small terminal stigma. Pod short, oblique, often turgid, 2-valved, continuous within. Seeds not strophiolate.—Erect or rarely prostrate shrubs or undershrubs, with digitately 3- or 1-foliolate leaves. Stipules striate, usually deciduous; stipulets none. Flowers in spike-like racemes or short panicles. Bracts large and persistent, or smaller, persistent or deciduous; bractlets none.

\* Capsules exerted from the calyx, usually 2-seeded.

× Racemes one-sided, the upper ones collected in a panicle. Floral bracts large, leafy, complicate, persistent. Leaves 1-foliolate.

○ Floral bracts glabrous; corolla yellowish,  $\frac{1}{4}$  in. long

*F. chappar.*

○○ Floral bracts puberulous or pubescent.

Stipules not above 3 lin. long, rather deciduous; bracts rounded and obsoletely pointed, not ciliate; corolla about 3 lin. long, white or yellowish.

*F. strobilifera.*

Stipules stiff-subulate, up to  $\frac{1}{2}$  an in. long; bracts more or less retuse, ciliate; corolla purplish, about 2 lin. long.

*F. bracteata.*

× × Racemes spike-like, solitary or clustered, or in panicles, rarely reduced to heads.

○ Leaves 1-3-foliolate.

Leaves simple; bracts small, persistent

*F. paniculata.*

Leaves 3-foliolate; racemes and calyx glandular; bracts subulate, very deciduous

*F. lineata.*

○○ Leaves digitately 3-foliolate. Spikes while young densely imbricate-bracted, the bracts deciduous long before opening of the flowers, or rarely persistent.

+ Low shrubs with a subterranean woody trunk.

Racemes small, silvery silky; calyx-teeth linear subulate,  $2\frac{1}{2}$ -3 lin. long; petiole winged, about  $\frac{1}{2}$ -1 inch long

*F. sericans.*

Racemes rather slender and lax; flowers almost sessile; calyx 2 lin. long or somewhat longer, the teeth falcate-lanceolate,

the lowermost one barely longer than the rest; petiole winged,  
1-2 in. long

+ + Well-developed undershrubs.

Petiole usually not winged; racemes dense, usually clustered and shorter than the petiole, greyish silk-hairy; bracts linear-lanceolate, subulate-acuminate, about 4 lin. long; calyx  $3\frac{1}{2}$  lin. long, the lobes linear, subulate-acuminate, the lowermost much longer; corolla  $3\frac{1}{2}$  lin. long, purplish, with a flesh-coloured purplish-streaked standard

*F. ferruginea.*

*F. congesta.*

As preceding, petiole narrowly winged; racemes appressed tawny pubescent, much shorter than the petiole; calyx 2 lin. long, the lobes linear-subulate; corolla slightly longer; pods puberulous and often densely granular-resinous

*F. prostrata.*

Petiole narrowly winged; racemes rather lax, greyish silk-hairy; calyx 3 lin. long, the lobes subulate; bracts ovate-lanceolate, cuspidate; corolla 3 lin. long, rose-coloured with greenish keel; pods puberulous

*F. semialata.*

Bracts and calyx appressedly brown or golden silk-hairy, the latter  $\frac{1}{2}$  in. long, the lobes subulate and the lowermost twice as long; corolla  $\frac{1}{2}$  in. long, white, with rose-coloured wings; petiole narrowly winged

*F. latifolia.*

Bracts scarious and stiff, very much longer than the buds, the lower sheathing ones up to 2 in. long, silvery silk-hairy; calyx-lobes linear, acuminate, the lowermost one doubly longer; corolla nearly  $\frac{1}{2}$  in. long; pods minutely appressed puberulous; petiole narrowly winged

*F. stricta.*

\*\* Capsules enclosed in the calyx, usually 1-seeded; flower heads involucred by the outer large bracts

*F. capitata.*

1. *Fl. chappar*, Ham.; H.f. Ind. Fl. ii. 227.—A shrub, 3-4 ft. high, the branches terete, appressed tawny pubescent; leaves 1-foliate, cordate-orbicular, on an  $1\frac{1}{2}$  in. long petiole, shortly and rather abruptly acuminate, 2-3 in. long and as broad or sometimes broader, 3- to almost 5-nerved at the base, indistinctly velvety above, minutely tawny pubescent beneath; flowers small, yellowish, very shortly pedicelled, forming a small rusty pubescent cluster perfectly enclosed in the complicate large floral bracts and forming axillary and terminal large-bracted racemes; bracts orbicular-reniform, retuse with a mucro,  $\frac{1}{2}$  an in. long, scarious and nerved, glabrous; calyx about  $2\frac{1}{2}$  lin. long, puberulous, the lobes lanceolate, acuminate; corolla glabrous,  $\frac{1}{2}$  in. long.

HAB.—Frequent in the Eng and dry forests of Pegu, Martaban, Prome and Ava.—Fl. C.S.; Fr. U.S.—1.—SS.=Dil.; CaS.—Metam.

2. *F. strobilifera*, Ait.; H.f. Ind. Fl. ii. 227.—A branched shrub, very variable in size (1-4 ft. high), the branches slightly angular, shortly tawny pubescent; stipules lanceolate, about 3 lin. long, more or less deciduous; leaves 1-foliate, on a 2-3 lin. long pubescent petiole, lanceolate to ovate-lanceolate, acuminate or acute, from 2-4 in. long, usually 6-nerved at the rounded or obtuse base, thinly and minutely appressed pubescent or pilose, especially along the nerves; flowers small, yellowish or white, in small tawny pubescent fascicles in the axils of the large complicate bracts, the

latter orbicular-reniform, usually rounded or obsoletely acute,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, sparingly and softly hairy, but not ciliate, membranous and nerved; calyx 2 lin. long, puberulous, the lobes lanceolate, acuminate; corolla glabrous, about 3 lin. long or somewhat longer; pods oblong to ovoid,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, 1- or 2-seeded, thinly pubescent.

HAB.—Common in all leaf-shedding forests and savannahs, all over Burma from Chittagong and Martaban down to Tenasserim.—Fl. R. S. & C.S.; Fr. H.S.—1.—SS. =  $\infty$ .

3. *F. bracteata*, Wight.—An erect branched shrub, 1 to 3 ft. high, the branches almost terete, tawny pubescent; stipules stiff, subulate, striate, up to  $\frac{1}{2}$  in. long, persistent; leaves 1-foliolate, on a strong pubescent petiole 2-3 lin. long, ovate to ovate- and linear-lanceolate, more or less acuminate, 2-4 in. long, almost glabrous above, beneath, especially along the nerves, thinly and shortly pubescent; flowers minute, pale-purple, very shortly pedicelled, solitary or in poor fascicles in the axils of the large complicate bracts, forming tawny pubescent large bracted racemes in the axils of the leaves and at the end of the branchlets; bracts broadly reniform, more or less retuse with a mucro, thinly hairy and distinctly ciliate, chartaceous and nerved,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long; calyx a line long or a little longer, velvety-puberulous, the lobes lanceolate, acute; corolla glabrous, 2 lin. long; pods about 3 lin. long, ovoid, puberulous.

HAB.—Frequent in all leaf-shedding forests, especially the lower mixed and savannah ones, all over Burma from Ava and Martaban down to Pega.—Fl. close of R.S. & C.S.; Fr. H.S.—1.—SS. =  $\infty$ .

4. *Fl. paniculata*, Wall.; Hf. Ind. Fl. ii. 227.—An erect branched shrub of a few feet in height, the branches terete, sparingly pubescent; leaves 1-foliolate, on a slightly pubescent petiole varying in length from  $\frac{3}{4}$  to  $\frac{1}{2}$  in., ovate, more or less cordate at the 3- or 5-nerved base, shortly acuminate, thin chartaceous, 2-3 in. long, sparingly and shortly pubescent along the nerves, especially beneath; flowers small, purplish (?), on puberulous about a line long pedicels, forming a pilose, slender, short, sparingly branched, almost sessile panicle at the end of the branches or in the axils of the upper leaves; bracts about 2 lin. long, ovate-lanceolate, pilose, deciduous; calyx nearly 2 lin. long, pubescent, the lobes linear-acuminate; corolla glabrous, 3 lin. long or longer; pods oblong,  $\frac{1}{2}$  an in. long, puberulous, usually 2-seeded.

HAB.—Upper Tenasserim.—Fl. C.S.

5. *F. lineata*, Roxb.; Hf. Ind. Fl. ii. 228.—An erect branched shrub, 1 to 4 ft. high, the branchlets almost terete and shortly but thinly pubescent; leaves digitately 3-foliolate, on a slightly pubescent petiole  $\frac{3}{4}$ - $\frac{1}{2}$  in. long; leaflets lanceolate, the lateral ones somewhat obliquely so, the terminal more obovate-lanceolate, very

shortly petioluled, more or less 3-plinerved at the base, acute, 1-2 in. long, almost glabrous above, beneath, especially along the nerves, appressed pubescent and conspicuously red-resinous-dotted; flowers small, whitish, with a purple keel and rose-coloured wings, on a line long pedicels, forming a slender glandular-pubescent peduncled raceme or a poorly branched panicle in the axils of the leaves and at the end of the branches; bracts subulate, small, very deciduous; calyx nearly  $2\frac{1}{2}$  lin. long, glandular-pubescent and sprinkled with copious red resinous dots, the lobes falcate-linear, acuminate; corolla glabrous, slightly longer than the calyx; pods obovoid-oblong, 3-4 lin. long, thinly puberulous and sprinkled with resinous red dots, usually 2-seeded.

HAB.—Common in the savannah and lower mixed forests, also in grassy places in cultivated lands all over Pegu, Prome and Ava; also Martaban.—Fl. C.S.; Fr. H.S.—L.—SS.=∞. *All.*

6. *F. sericans*, Kz.—A low branched undershrub up to  $2\frac{1}{2}$  ft. high, often burnt down to the woody strong trunk, the stems angular, greyish pubescent; leaves digitately 3-foliolate, on a stout, 3-angular, narrowly winged, pubescent petiole only  $\frac{2}{3}$  to 1 in. long; leaflets more or less obliquely ovate-lanceolate (the terminal one more rhomboid and equilateral), shortly petioluled, bluntish with a mucro to acute, 2-3 in. long, shortly and softly puberulous on both sides, beneath sprinkled with black resinous dots; flowers small, purplish, on a line long pedicels or almost sessile, forming shorter or longer silvery silk-hairy racemes either arising singly or several from the axils of the leaves, or (in burnt-down plants) crowdedly from the trunk (in this case the racemes longer and the flowers somewhat larger); bracts small, ovate, silk-hairy, very deciduous; calyx silvery silk-hairy,  $2\frac{1}{2}$  to nearly 3 lin. long, the lobes linear-subulate, the lowermost longest; corolla glabrous, slightly longer; capsules oblong-ovoid, puberulous, not or only sparingly crimson-resinous-dotted, usually 2-seeded.

HAB.—Frequent in the Eng forests of the Prome district and Martaban.—Fl. Fr. H.S.—L.—SS.=Lat.

7. *F. ferruginea*, Grah.—An erect undershrub branched from the base,  $\frac{1}{2}$ - $1\frac{1}{2}$  ft. high, the stems angular, densely tawny pubescent; stipules deciduous; leaves digitately 3-foliolate, on a sulcate pubescent petiole 1- $1\frac{1}{2}$  in. long and narrowly winged; leaflets more or less obliquely ovate (the terminal one equilateral and more rhomboid), very shortly petioluled, bluntish to acute, 2-3 in. long, while young almost velvety-puberulous above, beneath strongly nerved and net-veined, sparingly and shortly pubescent; flowers very small, almost sessile, purplish, forming tawny villous, short, spike-like racemes solitary or several together in the axils of the leaves and about as long as the petiole or shorter; bracts small, ovate, ap-

pressed pubescent, very deciduous; calyx 2 lin. long, tawny villous, the lobes linear, rather thick; corolla a little longer, glabrous; pods about 4 lin. long, oblong, puberulous, not or sparingly sprinkled with blackish resinous dots, usually 2-seeded.

HAB.—Frequent in the Eng forests of Prome; also Ava.—Fl. Fr. March.—  
L.—SS.—Lat.

8. *F. congesta*, Roxb.; H.f. Ind. Fl. ii. 228.—An erect branched undershrub, all softer parts shortly silk-hairy; stipules linear-lanceolate, acuminate, very deciduous; leaves digitately 3-foliolate, on a silky-pubescent, 3-angular, sulcate petiole 1 to 2 in. long and not winged; leaflets more or less ovate-lanceolate, the lateral ones obliquely so, shortly petioluled, 2-4½ in. long, acuminate, above a little roughish from minute hairs and more or less silky on the nerves, beneath shortly pubescent; flowers rather small, purplish with a flesh-coloured purplish streaked standard, very shortly pedicelled, racemose, forming short, smoke-grey, silky pubescent, contracted panicles in the axils of the leaves and often shorter than the petiole; bracts linear-lanceolate, subulate-acuminate, about 4 lin. long, deciduous; calyx 3½ lin. long, silky pubescent, the lobes linear, subulate-acuminate; corolla about equally long, glabrous; pods oblong or ovoid-oblong, about 3-3½ lin. long, puberulous, usually 2-seeded.

HAB.—Frequent in the savannahs and savannah forests all over Pegu and Martaban down to Tenasserim.—Fl. close of R.S.; Fr. C.S. & H.S.—L.—SS.—All. SiS.

9. *F. prostrata*, Roxb.—A small branched undershrub, 1 to 3 ft. high, the stems strongly 3-cornered and shortly appressed tawny pubescent; stipules linear-lanceolate, subulate-acuminate, deciduous; leaves digitately 3-foliolate, on a 3-cornered, narrowly winged, appressedly tawny pubescent petiole 1½-2 in. long; leaflets more or less lanceolate to linear-lanceolate, the lateral ones unequally so, shortly petioluled, long acuminate, 3-4 in. long, above roughish from short hairs, beneath very thinly pubescent and sprinkled with black resinous glands; flowers small, very shortly pedicelled, forming an appressedly tawny pubescent raceme in the axils of the leaves much shorter than the petiole; bracts very deciduous; calyx 2 lin. long, appressed tawny pubescent, the lobes linear-subulate; corolla slightly longer, glabrous; pods obliquely oblong, ½ in. long, puberulous and (in the Burmese plant) densely covered with purplish black resinous glands.

HAB.—Not unfrequent in the drier hill, especially the pine, forests of Martaban, at 4,000 to 5,000 ft. elevation.—Fr. March.—L.—Metam.

10. *F. semialata*, Roxb.—An erect, pretty simple or branched undershrub 3-4 ft. high, all parts shortly pubescent; stipules 3-

angular or lanceolate, subulate-acuminate, deciduous; leaves digitately 3-foliolate, on a 3-angular, narrowly winged, pubescent petiole 1-2 in. long; leaflets more or less ovate-lanceolate, the lateral ones obliquely so, shortly petioluled, acuminate, 2-4 in. long, above slightly roughish from very minute hairs, beneath black-gland-dotted, shortly and thinly appressed hairy and destitute or almost destitute of glandular dots; flowers rather small, rose-coloured with a greenish keel, very shortly pedicelled, racemose, the racemes simple or collected into terminal or axillary silky smoke-grey-pubescent panicles usually longer than the petiole or the leaf; bracts ovate-lanceolate, cuspidate, shorter than the calyx, very deciduous; calyx silky pubescent, about 3 lin. long, the lobes subulate; corolla about equally long, glabrous; pods obliquely ovoid,  $\frac{1}{2}$  in. long or somewhat smaller, puberulous, usually 2-seeded.

HAB.—Common in the leaf-shedding forests, and in grassy or shrubby places, more especially in the savannahs, all over Burma.—Fl. C.S. & Fr. H.S.—l.—SS.=∞.

11. *F. latifolia*, Bth.—A stout, erect, branched undershrub 3 to 5 ft. high, the branches (especially while young) appressedly tawny or golden pubescent; stipules very deciduous; leaves digitately 3-foliolate, on a 3-cornered yellowish or tawny puberulous 2-4 in. long petiole narrowly winged and much flattened on the upper side; leaflets more or less obliquely ovate, the terminal one obovate, on a strong tawny- or golden-pubescent petiolule 3 lin. long, shortly acuminate, 4-6 in. long, above almost velvety puberulous, beneath sparingly puberulous, especially on the nerves, and sprinkled with minute crimson resinous glands; flowers rather large and showy, white, with rose-coloured wings, very shortly pedicelled, forming short, solitary or clustered tawny or coppery silk-hairy, rather dense, sessile, spike-like racemes in the axils of the leaves and at the end of the branches; bracts ovate-lanceolate, acuminate, densely tawny silk-hairy, very deciduous, the outer ones up to  $\frac{1}{2}$  in. long; calyx about 6 lin. long, densely tawny silky pubescent; lobes subulate, the lowermost twice as long and linear; corolla glabrous, the standard about  $\frac{1}{2}$  in. long and nearly as broad.

HAB.—Not unfrequent in the hill-Eng. and the drier hill forests, more especially in the pine-forests, of Martaban, at 2,000 to 4,000 ft. elevation.—Fl. March.—l.—SS.=Metam. Lat.

12. *F. stricta*, Roxb.; II.f. Ind. Fl. ii. 228.—An erect, stout, branched undershrub, the branches angular, shortly appressed tawny pubescent; stipules linear-lanceolate, 1 in. long or longer, very deciduous; leaves digitately 3-foliolate, on a triquetrous slightly pubescent petiole  $\frac{1}{4}$  to  $\frac{3}{4}$  ft. long and often narrowly winged upwards; leaflets lanceolate to ovate-lanceolate, the lateral ones somewhat unequally so, on a strong, appressedly tawny pubescent

petiolule 2-3 lin. long, acuminate, 4-7 in. long, above more or less rough from minute appressed hairs, beneath (especially on the nerves) thinly and minutely appressedly fawnly pubescent; flowers small, greenish and dirty purple-streaked, with purple wings, very shortly pedicelled, forming a solitary or few dense, spike-like, sessile, silky pubescent racemes in the axils of the leaves, while young densely imbricated and strobiliform from the linear-lanceolate or lanceolate acuminate long but deciduous bracts, the basal outer bracts broader, thinly silk-hairy, up to  $1\frac{1}{2}$  in. long; calyx about 4 lin. long, densely silvery silk-hairy; lobes linear, acuminate, the lowermost nearly doubly longer; corolla glabrous, nearly  $\frac{1}{2}$  in. long; pods oblong,  $\frac{1}{2}$  in. long, minutely appressedly puberulous, 2-seeded.

HAB.—Not unfrequent in the open forests, especially the low and Eng forests, of Pegu; also Chittagong and Ava.—Fl. C.S.—l.—SS.—Dil.

13. *F. capitata*, Zoll. (*F. involucrata*, Bth.; H.f. Ind. Fl. ii. 229).—An erect meagre shrub, 3 to 5 ft. high, the branches terete or nearly so, more or less pubescent; stipules linear-oblong, acute, deciduous; leaves digitately 3-foliolate, on a pubescent  $\frac{1}{2}$ - $\frac{3}{4}$  in. long petiole; leaflets more or less lanceolate to linear, the lateral ones unequally so, acuminate or acute,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, shortly and softly puberulous on both sides, more so on the pale-coloured under-surface; flowers small, collected in dense pilose peduncled or almost sessile heads in the axils of the leaves and terminal; all bracts persistent, silky pilose, the outer ones up to  $\frac{2}{3}$  in. long, ovate, long silky-ciliate; calyx silky pilose, about 6 lin. long, the lobes subulate; corolla as long, minutely appressed sericeous; pods enclosed in the calyx, silky pilose, obovoid, about 2 lin. long, usually 1-seeded, the seed compressed, elliptical.

HAB.—Frequent in the open, especially in the low forests, ascending into the drier hill forests, all over Pegu and Martaban down to Upper Tenasserim.—Fl. Fr. C.S.—l.—SS.—Dil.—Metam. Arg.

### CAJANUS, DC.

Calyx-lobes acuminate or acute, the 2 upper ones more or less connate. Standard orbicular, reflexed, furnished with inflexed auricles; wings obliquely obovate; keel incurved at the blunt apex. Stamens united in a sheath, the vexillar one free; anthers uniform. Ovary almost sessile, with many ovules; style beardless, thickened above the middle and slightly dilated below the obliquely terminal stigma. Pod oblong to linear, transversely torose, septate within between the seeds, several-seeded.—Erect shrubs or undershrubs, with pinnately 3-foliolate leaves. Stipules deciduous; stipulets none. Flowers in axillary racemes. Bracts very caducous; bractlets none.

1. *C. Indicus*, Spreng.; H.f. Ind. Fl. 217.—*Pai-si-gong* or *Pai-yin-chong*.—An erect, branched, shrubby perennial, 5-8 ft. high, all parts more or less velvety pubescent; leaves pinnately 3-foliolate, on a pubescent petiole  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long; leaflets more or less lanceolate to oblong-lanceolate, shortly petioluled, acute, 1-2 in. long, velvety above, beneath more or less silvery silk-hairy; flowers middling-sized, yellow (or the outside brown-purple), on densely puberulous slender pedicels about 3-4 lin. long, arising by pairs and forming a long-peduncled but short, densely puberulous raceme in the axils of the leaves; calyx nearly 4 lin. long, tawny puberulous, the teeth lanceolate, subulate; corolla nearly  $\frac{1}{2}$  an in. long; pods oblong- to linear-lanceolate, subulate-acuminate, compressed and strongly transversely torose, 1-1 $\frac{1}{2}$  in. long, shortly pubescent, usually 4-seeded; seeds about 2 $\frac{1}{2}$  lin. long, ovoid, glossy black.

IIAN.—Generally cultivated in several varieties all over Burma, up to 3,000 ft. elevation.—Fl. Fr. C.S.—l.—SS. =  $\infty$ .

### CYLISTA, Ait.

Calyx-lobes bladderly, blunt, much enlarging after flowering, the 2 upper ones united in a single 2-lobed one, the 2 lateral ones much smaller, the lowermost largest and boat-shaped. Standard almost orbicular, inflexed-auricled at base, the wings narrow; keel incurved, blunt. Stamens united in a sheath, the vexillar one free; anthers uniform. Ovary almost sessile, 1-ovuled; style filiform with a terminal stigma. Pod enclosed in the enlarged scarious calyx, 2-valved, 1-seeded.—Twining, shrubs with pinnately 3-foliolate leaves, the leaflets resinose-dotted beneath. Flowers in axillary and terminal racemes. Bracts membranous, deciduous; bractlets none.

1. *C. scariosa*, Ait.; H.f. Ind. Fl. ii. 219.—An extensive twining shrub, or rather undershrub, all parts more or less pubescent or puberulous; leaves pinnately 3-foliolate, on a pubescent 1-1 $\frac{1}{2}$  in. long petiole; leaflets more or less ovate, the lateral ones obliquely so, acuminate, 1-2 in. long, on both sides (more so beneath) shortly pubescent; flowers middling-sized, yellow with orange longitudinal veins, on 2-3 lin. long pubescent pedicels, forming shorter or longer puberulous racemes in the axils of the leaves and often also at the end of the branchlets; calyx in flower about  $\frac{1}{2}$  in. long, in fruit doubly longer, puberulous; corolla much shorter and enclosed in the calyx; pods quite enclosed in the scarious large calyx, about 4 lin. long, falcate-obovate, almost stalked, pubescent, 1-seeded.

IIAN.—Frequent in the leaf-shedding forests, especially the mixed ones, but also in deserted toungyas, etc., all over Pegu and Martaban.—Fl. close of R.S.; Fr. H.S.—l.—SS. =  $\infty$ .

## MUCUNA, Ad.

Calyx broadly bell-shaped, 4-toothed, the upper tooth broader and bidentate, the lowermost longer. Standard shorter than the wings, the keel as long or longer than the wings, with a horny point or beak at the incurved end. Stamens united in a sheath, the vexillar one free; anthers often bearded, alternately longer and erect, the shorter didymous and versatile. Ovary sessile with usually few ovules; style filiform, not bearded, with a minute terminal stigma. Pod linear to oblong and almost ovoid, variously transversely laminate, ribbed or plain, 2-valved, septate between the large seeds.—Scandent or twining shrubs or undershrubs with pinnately 3-foliolate leaves. Stipules deciduous; stipulets often present. Flowers usually showy, in pendulous peduncled axillary racemes or corymbs. Bracts small or large, deciduous.

\* *Pods transversely and obliquely lamellate, 1-seeded* . . . *M. monosperma*.

\* \* *Pods plain or longitudinally ribbed*.

○ *Pods shortly stalked or acuminate at the base. Seeds orbicular.*

Pod 3-4 in. long, appressed tawny hispid, the sutures extended in a plaited double wing; flowers white or yellowish . . . *M. gigantea*.

Pod 1-3 ft. long, glabrescent, towards the sutures marked with a fold-like longitudinal rib; flowers variegate-dark-purple . . . *M. macrocarpa*.

○ ○ *Pods sessile, densely hispid. Seeds transversely oblong.*

Peduncle naked; flowers arising from a knob; pods with 2 longitudinal ribs along the upper suture; leaves pubescent beneath . . . *M. pruriens*.

Peduncle bracted; flowers from a secondary peduncle about 2 lin. long; pod without ribs; leaves appearing glabrous to the naked eye . . . *M. bracteata*.

1. *M. monosperma*, DC.; H.f. Ind. Fl. ii. 185.—A large twining shrub, the shoots rusty-pubescent; leaves pinnately 3-foliolate, on a rusty-pubescent 3-4 in. long petiole; leaflets more or less ovate, the lateral ones very obliquely so, on a rusty-pubescent petiolule 2-3 lin. long, apiculate to acute, 2-4 in. long, chartaceous, glabrous above, beneath tawny or rusty-pubescent and more or less glabrescent; flowers large, dark-purple, with a white keel, on about  $\frac{2}{3}$ - $\frac{3}{4}$  in. long pubescent pedicels, forming a very short-peduncled nodding pubescent corymb in the axils of the leaves or above the scars of the fallen ones; bracts about a line long, ovate, acuminate; calyx about  $\frac{1}{2}$  in. wide, minutely hispid and, besides, more or less covered with tawny or rusty-brown fragile bristles; corolla about  $1\frac{1}{2}$  in. long, the standard about half as long as the keel; pods thick, obliquely ovate, contracted in a short very thick stalk, tawny velvety-tomentose and covered with long fragile stinging bristles, all round extended in a double spreading waved wing and similarly transversely and obliquely lamellate all over the valves, the lamellæ either continuous or irregularly broken half-way

and all simple and waved; seed solitary, ovoid-reniform, about an in. long, brownish black, encircled on the back with a grey opaque hilum.

HAB.—Frequent in the mixed forests, especially the lower ones, all over Pegu, Chittagong, and Arracan.—Fl. close of R.S.; Fr. D.S.—l.—SS.—SiS. All.

2. *M. macrocarpa*, Wall.; II.f. Ind. Fl. ii. 186.—A powerful arborescens climber, the stems as thick as the arm or thicker (up to 2 ft. girth), the shoots thinly tawny pubescent; stipules very deciduous; leaves pinnately 3-foliolate, on a 3-5 in. long glabrescent petiole; leaflets more or less ovate, the lateral ones very obliquely so, on a 3-4 lin. long petiolule, shortly subulate-cuspidate, 4-6 in. long, chartaceous, while young herbaceous and on both sides appressed tawny pubescent, adult glabrous above; flowers large, greenish with dark-purple wings and brownish keel, on  $\frac{1}{2}$  an in. long tawny pubescent pedicels, usually by 2 or 3 from a knob or reduced secondary peduncle and forming an elongate pendulous tawny-pubescent raceme in the axils of the leaves; bracts very deciduous; calyx tawny-velvety, about  $\frac{3}{4}$  in. wide; corolla  $1\frac{1}{2}$  to nearly 2 in. long, the standard about half as long as the keel; pods 1-3 ft. long by  $1\frac{1}{2}$  in. broad, linear and sinuate-contracted between the seeds, marked with a fold-like longitudinal rib towards the margins of both sutures, while young tawny tomentose, glabrescent, many-seeded, the lower joints gradually narrower and empty; seeds flat, transversely elliptically-orbicular, nearly an inch long, brown, encircled with a pale-coloured hilum.

HAB.—Not unfrequent in the hill forests, especially the drier and pine forests of Martaban, east of Tounghoo, at 4,000 to 6,000 ft. elevation; also Ava.—Fl. March; Fr. H.S.—l.—SS.—Metam.

## DIOCLEA, HBK.

The 2 upper calyx-lobes entirely connate, the lateral ones smaller. Standard orbicular or ovate, reflexed, minutely auricled at the base; wings obovate or oblong, free, longer than the incurved beaked or blunt keel. Stamens united in a sheath, the vexillar one entirely or only at the base free; anthers difform, the alternating ones minute and gland-like. Ovary sessile, with 2 or more ovules; style incurved, beardless, thickened or dilated towards the apex, with a terminal truncate stigma. Pod flat, compressed or somewhat turgid, coriaceous, 2-valved, septate, the upper suture dilated or 2-winged.—Twining shrubs, with pinnately 3-foliolate leaves. Stipules herbaceous; stipulets present. Flowers clustered, in axillary racemes. Bracts narrow, especially the upper ones partially persistent; bractlets small, persistent or deciduous.

1. *D. reflexa*, II.f.; Ind. Fl. ii. 196.—A large scandent shrub,

the younger branchlets thinly tawny hirsute; stipules  $\frac{1}{2}$  an in. long linear-lanceolate, acuminate; leaves pinnately 3-foliolate, on a hirsute petiole; leaflets on a short tawny hirsute petiolule, obovate to obovate-oblong, the lateral ones somewhat unequal, apiculate or shortly and abruptly acuminate, 3-4 in. long, thin coriaceous, on both sides (more so beneath) thinly tawny hairy, more or less glabrescent above; flowers middling-sized, pale-lilac, shortly and strongly pedicelled, clustered, forming a robust, long-peduncled, tawny tomentose raceme in the axils of the leaves; bracts linear, subulate-acuminate,  $\frac{1}{2}$ -1 in. long, appressed tawny pubescent, the upper ones persistent; calyx tawny silk-hairy, nearly  $\frac{1}{2}$  an in. long, the 2 upper lobes connate and rounded; corolla about  $\frac{3}{4}$  in. across; pods dimidiate-oblong,  $2\frac{1}{2}$  in. long by  $1\frac{1}{2}$  broad or larger, dilated at the upper suture, while young appressed and densely tawny pubescent, more or less glabrescent, 2- or rarely 1-seeded.

HAB.—Andamans.

### LESPEDEZA, Mich.

Calyx-lobes or -teeth almost equal or the 2 upper ones shortly united. Standard orbicular, obovate or oblong, clawed or rarely sessile; keel blunt or beaked, free. Stamens all united in a sheath or more usually the vexillar one free; anthers all reniform. Ovary sessile or stalked, with a solitary or rarely 2 ovules; style filiform, with a small terminal stigma. Pod ovate to orbicular, flat, net-veined, indehiscent.—Shrubs or undershrubs, rarely herbs, with pinnately 3- or rarely 1-foliolate leaves. Stipules usually small or very deciduous; stipulets none. Flowers in axillary clusters or racemes often collected in terminal panicles.

× Flowers in axillary almost sessile clusters . . . . . *L. sericea*.

× × Flowers in axillary and terminal racemes often collected in a terminal panicle.

+ All parts densely pubescent; bracts deciduous . . . . . *L. pinetorum*.

+ + Branchlets and leaves beneath appressed canescent-puberulous.

Racemes glandular-pubescent; bracts persistent . . . . . *L. decora*.

Racemes tawny pubescent, not glandular; bracts deciduous . . . . . *L. parviflora*.

1. *L. sericea*, Miq.; H.f. Ind. Fl. ii. 142.—A small erect shrub much branched from the base; 1-3 ft. high, all softer parts more or less appressed silvery pubescent; stipules stiff, linear-subulate, about  $1\frac{1}{2}$  lin. long; leaves small, pinnately 3-foliolate, on a silky pubescent petiole 2-3 lin. long; leaflets oblong to linear-cuneate, almost sessile,  $\frac{1}{3}$ - $\frac{2}{3}$  in. long, truncate at the apex and bristly mucronate, beneath more or less thinly appressed silk-hairy; flowers small, pale yellow or white with the standard purple at the middle, very shortly pedicelled, forming a short, poor, almost sessile

appressed silk-hairy cluster in the axils of the leaves, those of the lower clusters often apetalous with imperfect stamens; calyx 2 to nearly 3 lin. long, slightly pubescent, the lobes stiff, linear-subulate, acuminate; corolla 4 lin. long; pods almost rotundate, compressed, appressed silk-hairy,  $1\frac{1}{2}$  to 2 lin. long, 1- rarely 2-seeded.

HAB.—Ava hills east of Bhamo.—Fl. May.

2. *L. pinetorum*, Kz.—An erect branched or almost simple-stemmed shrub, 2-4 ft. high, all parts softly tawny pubescent, the stems angular; stipules 2-3 lin. long, ovate-lanceolate, acuminate, pubescent; leaves pinnately 3-foliolate, on a strong tawny pubescent petiole  $\frac{1}{2}$ -1 in. long; leaflets on a very thick and short petiolule, elliptically to oval-oblong, blunt or bluntish with a mucro, 1-2 in. long, almost coriaceous, puberulous and almost wrinkled above, beneath densely pubescent, the nervation prominent; flowers rather small, yellowish with the keel pale-rose at the tip, on pubescent 1-2 lin. long pedicels, forming dense rather robust tawny pubescent racemes in the axils of the leaves and usually collected also in a short panicle at the end of the branches, flexuose; calyx  $2\frac{1}{2}$ -3 lin. long, tawny villous, the lobes subulate; corolla about  $3\frac{1}{2}$  to 4 lin. long; pods obliquely ovate, compressed, stylose-acuminate, about 3 lin. long, appressed silky pubescent.

HAB.—Not unfrequent in the drier hill forests, especially the pine forests, of the Martaban hills, east of Tounghoo, at 4,000 to 6,000 ft. elevation.—Fl. Fr. March.—l.—SS.—Metam.

3. *L. decora*, Kz.; H.f. Ind. Fl. ii. 144.—An erect branched shrub, 3 to 5 ft. high, the stems angular and minutely greyish, when young appressed tawny pubescent; stipules about 3 lin. long, stiff, linear-subulate; leaves pinnately 3-foliolate, on a slender 1-1 $\frac{1}{2}$  in. long petiole; leaflets shortly petioluled, oboval to almost elliptical, rounded with a mucro, chartaceous, 1-1 $\frac{1}{2}$  in. long, dark-green and glabrous above, beneath glaucescent and minutely appressed pubescent; flowers bright-blue, middling-sized, on slender about  $\frac{1}{2}$  in. long glandular-pubescent pedicels, forming short but slender tawny glandular-pubescent persistent-bracted racemes often collected into short panicles in the axils of the leaves and at the end of the branches; bracts ovate-lanceolate, subulate-acuminate, about a line long, glandular-puberulous; calyx about 3 lin. long, tawny pubescent, the lobes ovate, acuminate; corolla  $\frac{1}{2}$  an in. long; pods (unripe) obliquely ovate-lanceolate, acuminate, compressed, shortly appressed silk-hairy.

HAB.—Frequent in the drier hill forests, especially the pine forests, at 4,000 to 6,000 ft. elevation.—Fl. March; Fr. Apr.—l.—SS.—Metam.

4. *L. parviflora*, Kz.; H.f. Ind. Fl. ii. 144.—A shrub, the branchlets angular, appressed silky-puberulous; stipules stiff, linear-

subulate, about 2-2½ lin. long; leaves pinnately 3-foliolate, on a slender canescent petiole ½ an in. long; leaflets shortly petioluled, elliptical to elliptically ovate, ½-1 in. long, chartaceous, glabrous and dark-green above, beneath glaucescent and minutely appressed greyish pubescent; flowers small, blue (?), on tawny pubescent ½-1 lin. long pedicels, forming stiff tawny pubescent racemes in the axils of the leaves and often crowded at the end of the branchlets; bracts deciduous; calyx densely tawny pubescent, about 2 lin. long, the lobes subulate; corolla about 3½ lin. long; pods (unripe) obliquely ovate, acuminate, silk-hairy.

HAB.—Martaban, Karen hills.

### DESMODIUM, Desv.

Calyx-tube short, the 2 upper lobes or teeth more or less united, the lower 3 acute or subulate-acuminate. Standard from oblong to orbicular, at the base tapering or clawed; wings adhering to the keel, the latter blunt or rarely somewhat beaked, rather straight or incurved. Stamens all united in a closed tube or the vexillar one more or less free; anthers conform. Ovary sessile or stalked, with 2 or more ovules; style inflexed or incurved, with a terminal minute capitate stigma. Pods longer than the calyx, sessile or stalked, compressed, the articles more or less dehiscent along the lower suture or indehiscent, many- rarely 1-seeded.—Shrubs or undershrubs, rarely herbs, with pinnately 3-foliolate or 1-foliolate leaves. Stipules and stipulets present. Flowers usually small, in terminal racemes or panicles, or rarely in axillary umbels or clusters.

\* *Flowers clustered in the axils of bract-like large complicate 2-foliolate persistent floral leaves.*

× Pods glabrous, except on the margin, net-veined; petiole only 2-3 lin. long . . . . . *D. pulchellum.*

× × Pods pubescent or villous pubescent.

Leaflets 1-2 in. long, rounded or almost retuse . . . . . *D. restitum.*

Leaflets 3-5 in. long, acuminate . . . . . *D. grande.*

\* \* *Inflorescence without floral leaves. Bracts deciduous, rarely persistent.*

○ Leaves 1-foliolate.

Branches 3-4-cornered; petiole leafy-winged . . . . . *D. triquetrum.*

Branches and petioles terete . . . . . *D. latifolium.*

○ ○ Leaves 3-foliolate.

+ Pods indehiscent.

+ Flowers in small axillary umbels.

Pod-joints ½ in. long . . . . . *D. umbellatum.*

Pod-joints only 2 lin. long . . . . . *D. cephalotes.*

++ Flowers in terminal or axillary racemes or panicles.

△ Pod-joints, usually as long or about doubly longer than broad, more or less indented on the one or both sutures.

- § Bracts of young inflorescence narrow and inconspicuous and not imbricating . . . *D. laburnifolium*.
- § § Bracts of young inflorescence scarious and large, forming imbricate cones, the basal ones often persistent.
- ‡ Basal pod-joint shortly but distinctly stalked.
- Racemes sessile or nearly so, robust; pod-joints 4 lin. long by  $2\frac{1}{2}$  broad, grey-villous, much indented on the lower suture; branchlets rather terete . . . *D. confertum*.
- Racemes very slender and usually shorter than the leaves, sessile or branched from the base; pod-joints as in preceding, sparingly and shortly hirsute; branches angular . . . *D. Karensium*.
- ‡ ‡ Basal pod-joint sessile.
- Pod-joints  $1\frac{1}{2}$ -2 lin. long and nearly as broad, appressed hirsute; branchlets sharply angular, often villous on the angles . . . *D. floribundum*.
- Pod-joints about a line long and as broad, densely brown-hooked-hispid; branchlets almost terete . . . *D. sequax*.
- △ △ Pod-joints 4-5 times longer than broad, or stalk-like narrowed at the base.
- Pod-joints crescent-shaped, abruptly constricted at both ends; leaves oblong, strongly parallel-nerved . . . *D. concinnum*.
- + + Pods dehiscent.
- † Bracts of young inflorescence more or less persistent. Pods distinctly jointed.
- Leaves 1-3-foliolate; fruiting pedicels refracted; racemes shorter than the leaves . . . *D. retroflexum*.
- Fruiting pedicels erect; racemes elongate . . . *D. heterocarpum*.
- † ‡ All bracts deciduous; valves of pod continuous, the joints marked only by transverse lines.
- Flowers purple; pod-joints broader than long, densely and shortly hirsute . . . *D. gyroides*.

1. *D. pulchellum*, Bth.; H.f. Ind. Fl. ii. 162; Brand. For. Fl. 145.—*Young-la-min*.—An erect branched shrub, 3-4 ft. high, the softer parts shortly pubescent; stipules and stipulets small, stiff, lanceolate, subulate-acuminate; leaves pinnately 3- or occasionally 1-foliolate, on an appressed pubescent petiole 2-3 lin. long; leaflets more or less lanceolate (the lateral ones much smaller and oblique), on a very short petiolule, 1-3 in. long, bluntish to bluntish acuminate with a mucro, slightly remote-repand, chartaceous, above glabrous or nearly so, beneath, especially along the nerves and veins, minutely pubescent; flowers small, yellow, in a small sessile head or cluster, in the axil of a 2-foliolate floral leaf and more or less enclosed in it, forming elegant leafy racemes at the end of the branchlets collected in a panicle; floral leaves complicately 2-foliolate, on a 2 to 3 lin. long petiole terminating in a longer or shorter bristle, the leaflets more or less broadly ovate to almost orbicular,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, very shortly petioluled, more or less oblique, rounded or retuse with a mucro, almost glabrous or puberulous; bracts linear-lanceolate to subulate, small; calyx about a line long, pubescent, the teeth lanceolate, acuminate; corolla about 3 lin. long, glabrous; pods flat, usually 2-jointed, the joints more or less rounded at both sides,

about  $2\frac{1}{2}$  lin. long and nearly as broad, laxly net-veined and glabrous, except on the margins, each containing a single glossy pale-coloured seed.

HAB.—Frequent in the leaf-shedding, especially the open and dry, forests all over Burma from Ava and Martaban down to Tenasserim.—Fl. R.S.; Fr. C.S.—l.—SS.—∞.

2. *D. grande*, Kz.; H.f. Ind. Fl. ii. 162.—An erect branched shrub, the branchlets softly and shortly tawny tomentose; stipules and stipulets stiff and short, linear, subulate-acuminate; leaves pinnately 3- or occasionally 1-foliolate, on a tawny tomentose petiole  $\frac{1}{2}$  to 1 in. long; leaflets 3-5 in. long, shortly petioluled, more or less ovate, rather long but bluntish acuminate with a mucro, entire, chartaceous, puberulous above, softly and almost tawny pubescent beneath; flowers forming leafy, axillary and terminal racemes collected in a terminal panicle, the rachis tawny tomentose; floral leaves 2-foliolate, on a 2-3 lin. long tomentose petiole terminating in a long bristle, the leaflets obliquely oval to almost orbicular, rounded or retuse with a mucro, more or less puberulous, about an in. long; pods 2-3-jointed, tomentose-pubescent, twice as large as those of the preceding species.

HAB.—Ava, Irrawaddi valley.—Fr. C.S.

3. *D. vestitum*, Bth.; H.f. Ind. Fl. ii. 162.—An erect branched shrub, the younger branches softly tawny pubescent; stipules broadly lanceolate, acuminate, about  $1\frac{1}{2}$  lin. long; leaves pinnately 3-foliolate, on a rusty or tawny tomentose 3-4 lin. long petiole; leaflets oval or elliptical, shortly petioluled, rounded or retuse, 1-2 in. long, minutely pubescent above, appressed silky pubescent beneath; flowers in leafy tawny tomentose racemes collected in a terminal panicle; floral leaves 2-foliolate, on a tomentose about a line long petiole terminating in a short bristle, cordate-orbicular, retuse with a mucro, puberulous,  $\frac{3}{4}$ -1 in. long; calyx pubescent, the lobes lanceolate, acuminate; pods 2-3-jointed, twice as large as those of *D. pulchellum*, densely tawny pubescent.

HAB.—Upper Tenasserim.

4. *D. triquetrum*, DC.; H.f. Ind. Fl. ii. 163.—*Mot-so-lam-ma*.—An erect or spreading branched undershrub or shrub 2 to 4 ft. high, the branches sharply 3- (or 4-) cornered and more or less villous or pubescent on the angles; stipules scarious, linear-lanceolate, up to  $\frac{1}{2}$  in. long, deciduous; leaves 1-foliolate, the petiole  $\frac{1}{4}$ -1 in. long, leafy-winged and produced in a sharp tooth at both sides of the rounded apex; leaflets 2-5 in. long, linear-oblong to oblong-lanceolate, very shortly petioluled, acuminate to bluntish chartaceous, glabrous or slightly hispid beneath along the nerves; flowers small,

pink or pale rose-coloured, on filiform 2-3 lin. long hairy pedicels, clustered, and forming slender, terminal and axillary, slightly hairy racemes; bracts linear, acuminate, small, but stiff, strongly parallel-veined; calyx sparingly hispid, 2 lin. long, the teeth rather short, subulate; corolla nearly 4 lin. long, glabrous; pods oblong to linear-oblong, straight or slightly curved, flat, villous to glabrous, many-jointed, the joints about 2 lin. long and nearly twice as broad, rounded at one side, or almost straight, each containing a single glossy pale or dark-coloured seed.

HAB.—Common all over Burma from Chittagong and Ava down to Tenasserim and the Andamans, in all leaf-shedding forests, especially the mixed ones, but ascending also into the drier hill forests up to 5,000 ft. elevation.—Fl. Fr. close of R.S. and C.S.—L.—SS.—=œ.

5. *D. latifolium*, DC.; Brand. For. Fl. 145; H.f. Ind. Fl. ii. 168.—*Kio-pan-ben*.—A large bushy shrub, 3 to 5 ft. high and higher, with more or less spreading branches, all the softer parts softly pubescent or tomentose; stipules linear-subulate, rather stiff; leaves 1-foliate, on a tawny villous petiole 2 to 4 lin. long; leaflets more or less ovate to ovate-oblong, very shortly petioluled, rounded at the base, bluntish or acute with a mucro,  $1\frac{1}{2}$ -3 in. long, firmly membranous, slightly repand, above appressed and rather stiff-hairy, beneath softly pubescent or almost villous; flowers small, purple, on very short pubescent pedicels, clustered and forming a tawny pubescent or almost villous raceme in the axils of the leaves and terminal, and often also collected in lax terminal panicles; bracts and bractlets small, linear-subulate; calyx a line long, pubescent, the teeth linear-lanceolate; corolla about 3 lin. long or somewhat longer, glabrous; pods linear-oblong, often somewhat curved, sessile, compressed, villous, 6-3-jointed, the joints almost quadrangular with the outer suture rounded, about 2 lin. long, each containing a single brown seed.

HAB.—Frequent in the dry and open forests of Ava, Prome, Pegu, and Martaban.—Fl. close of R.S.; Fr. C.S.—L.—SS.—=Dil. CaS.

6. *D. umbellatum*, DC.; H.f. Ind. Fl. ii. 161; Bedd. Sylv. Madr. 87.—A large shrub, 6 to 10 ft. high, the shoots silky pubescent; stipules about a line long, lanceolate, ciliate, stipulate; leaves pinnately 3-foliate,  $\frac{1}{3}$ - $\frac{1}{2}$  ft. long, on a pubescent petiole  $\frac{1}{2}$  to 1 in. long; leaflets more or less elliptical to elliptically ovate, the terminal one often more obovate and larger,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, on densely appressed pubescent petiolules a line long or a little longer, acute or bluntish with a mucro, chartaceous, glabrous above, beneath glaucescent and thinly appressed silk-hairy; flowers small, white, on 2 lin. long pedicels, forming a short-peduncled densely silky villous umbel in the axils of the leaves and usually shorter than the petiole; bracts and bractlets longer than the pedicels, lanceolate, silky

villous; calyx yellowish silky villous, more than 2 lin. long, the teeth linear-lanceolate, acuminate; corolla glabrous,  $\frac{1}{2}$  in. long; pods on a 3 lin. long densely pubescent peduncle, usually destitute of the calyx, oblong to elongate-oblong, more or less curved, densely appressed pubescent, 4-1-jointed, the articles reniform-oblong,  $\frac{1}{2}$  in. long, compressed with rounded borders, each joint containing a compressed, reniform-oblong, glossy black seed.

HAB.—Not unfrequent in the sandy beach jungles along the coasts of the Andamans and probably all along the Burmese coasts, reappearing again in Ava, on the limestone hills of Seguin.—SS. = Aren. Ca. (P)

7. *D. cephalotes*, Wall; H.f. Ind. Fl. ii. 162; Bedd. Sylv. Madr. 87 t. 12, f. 4.—A large shrub, often growing out into a small tree with a short trunk about 2-3 ft. in girth, all softer parts appressed silk-hairy; stipules scarious, linear-lanceolate, subulate, acuminate,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long; stipulets setaceous-filiform, long; leaves pinnately 3-foliolate, on a channelled petiole  $\frac{1}{2}$  to an in. long; leaflets obovate to elliptically lanceolate, on a line long pubescent or almost glabrous petiolule, shortly acuminate to acute,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  lin. long, chartaceous, glabrous above, beneath, especially along the straight parallel nerves, appressed silvery silk-hairy, or rarely almost glabrous; flowers small, white, on short, slender, curved, silk-hairy pedicels, forming an almost sessile or short-peduncled, more or less silky pubescent umbel in the axils of the leaves and shorter than the petioles; bracts and bractlets linear, subulate-acuminate, longer than the pedicels; calyx silky pubescent, nearly 3 lin. long, the lobes linear-subulate, the lowermost much elongated; corolla glabrous, about  $\frac{1}{2}$  in. long; pods linear-oblong, flat, more or less curved, more or less silky pubescent, rarely almost glabrous,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, 2-5- rarely by abortion 1-jointed, the articles about 2 lin. long and broad or somewhat longer, rounded on one side, each containing a single brown compressed elliptically reniform seed.

HAB.—Common all over Ava and Chittagong down to Pegu and Arracan, in the mixed forests, especially the lower ones, also entering the savannahs.—Fl. close of R.S.; Fr. C.S.—1.—SS. =  $\infty$ . SiS. All.

8. *D. sequax*, Wall; H.f. Ind. Fl. ii. 170.—An erect-branched shrub, 3-4 ft. high, the branchlets brown-puberulous; stipules curved-linear, acute, pubescent, 2 lin. long or longer; leaves pinnately 3-foliolate, on a densely brown-pubescent petiole  $1\frac{1}{2}$  in. long; leaflets more or less ovate (the lateral ones obliquely so and somewhat smaller), on a line long rusty-pubescent petiolule, shortly acuminate, slightly repand,  $1\frac{1}{2}$ -3 in. long, membranous, shortly and thinly appressed hairy above, more densely so on the pale-coloured under-surface; flowers small, purple (?), on slender about 3 lin. long pubescent pedicels, forming short, usually paired, tawny-pubescent racemes in the axils of the leaves and often passing into a

terminal leafy panicle; bracts about 1-1½ lin. long, linear-lanceolate, acuminate, pubescent, very deciduous; calyx more than a line long, sparingly hirsute, the teeth lanceolate-acuminate; corolla about 4 lin. long; pods almost moniliform, elongate-linear, sessile, compressed, shortly and densely brown or greyish brown hirsute, 7-12-jointed, the articles nearly 1½ lin. long and broad, indehiscent, on the outer suture slightly, on the inner strongly, rounded, each containing a blackish almost orbicular seed.

HAB.—Martaban hills, east of Tounghoo, in the drier forests, at 4,000 to 5,000 ft. elevation.—Fr. March.—1.—SS. = Metam.

9. *D. Karensium*, Kz.—A large simple or almost simple-stemmed shrub, all softer parts more or less pubescent, the stems angular, glabrescent; leaves 3-foliolate, large, on a glabrescent petiole 2-3 in. long; leaflets rhomboid-ovate, the lateral ones obliquely so, on a very short, stout, tomentose petiolule, shortly acuminate, 3-5 in. long, membranous, above minutely puberulous, beneath almost greyish pubescent; racemes filiform, branched from the base or more usually forming a sessile or almost sessile puberulous glabrescent panicle in the axils of the leaves and often shorter than them; pedicels filiform, by 3-1, puberulous, 3-4 lin. long; bracts deciduous, linear-lanceolate, acuminate, hirsute-ciliate, deciduous, the basal ones more persistent, larger and 3-3½ lin. long; calyx (in fruit) sparingly hirsute, about 2 lin. long or somewhat longer, the lobes linear-subulate; pods linear, 1-1½ in. long, many-jointed, shortly hirsute, the joints a little longer than broad, 3 lin. long, truncate at both ends, the outer suture slightly, the inner strongly, rounded.

HAB.—Not unfrequent in the drier hill forests, especially the pine forests, of the Martaban hills, at 4,000 to 5,000 ft. elevation; also Ava, Khakyen hills.—Fr. March-Apr.—1.—SS. = Metam.

10. *D. floribundum*, Don.; H.f. Ind. Fl. ii. 167.—An erect-branched shrub, 2-4 ft. high, the stems and branches, especially while young, 5-angular and densely villous fringed along the angles; stipules appressed pubescent, linear-lanceolate, subulate-acuminate, ½-½ in. long; leaves pinnately 3-foliolate, on a tawny pubescent strong petiole ½-1 in. long; leaflets more or less obovate (the lateral ones oblique and often more ovate), blunt or acute to shortly acuminate, mucronate, 1-3 in. long, entire or nearly so, firmly membranous, above thinly, beneath more densely, appressed pubescent and glaucescent; flowers rather small, purple (?), on capillary 2-3 lin. long puberulous pedicels, forming longer or shorter tawny pubescent racemes usually by 2 or 3 or solitary in the axils of the leaves or in the forks of, or terminating, the branchlets; bracts very deciduous, linear-lanceolate, subulate-acuminate, 3-4 lin. long; calyx very slightly pilose, nearly 2 lin. long, the lobes lanceolate-

acuminate, the lateral ones shorter; corolla about 4 lin. long; pods sessile, elongate-linear, compressed, appressed tawny or brown-hirsute, sinuately 7- to 4- or fewer-jointed, the articles  $1\frac{1}{2}$  to 2 lin. long and somewhat narrower, slightly curved on the outer, rounded on the inner margin, each containing a single reniform-oblong brown seed.

HAB.—Not unfrequent in the hill forests of Martaban and Upper Tenasserim, at 4,000 to 5,000 ft. elevation.—Fl. close of R.S.; Fr. March.—L.—SS. = Metam.

11. *D. concinnum*, DC.; H.f. Ind. Fl. ii. 170.—An erect, branched shrub, 2-4 ft. high, the younger branchlets shortly tawny pubescent; stipules scarious,  $\frac{1}{2}$  an in. long or somewhat shorter, linear-lanceolate, subulate-acuminate, striate, glabrous; stipulets subulate, 3-2 in. long; leaves pinnately 3-foliolate, on an appressed pubescent petiole  $\frac{1}{2}$ - $\frac{1}{2}$  in. long; leaflets obovate-oblong to elliptically-oblong, on a short tawny pubescent petiolule, mucronate-acute, 1-2 $\frac{1}{2}$  in. long, entire, chartaceous, above very slightly, beneath thinly, appressed pubescent, the oblique lateral nerves almost straight and parallel; flowers rather small, purple (?), on spreading straight pilose pedicels about  $\frac{1}{2}$  in. long, usually paired and forming tawny glandular-pubescent slender terminal racemes; bracts large but very deciduous, lanceolate, acuminate  $\frac{1}{2}$ - $\frac{1}{2}$  in. long, sparingly pilose but densely pilose-fringed; calyx shallow, about 2 $\frac{1}{2}$  lin. across, minutely and sparingly puberulous, 2 of the teeth more produced and acuminate; corolla glabrous, nearly  $\frac{1}{2}$  in. long; pods on a spreading 2 lin. long stalk, minutely glandular-puberulous, 5-1-jointed, the articles somewhat compressed, crescent-shaped, about 2 to 2 $\frac{1}{2}$  lin. long, indehiscent, each containing a single glossy-brown reniform seed.

HAB.—Not unfrequent in the hill pastures and in grassy places of the drier hills, especially the pine forests, of Martaban, at 4,000 to 6,000 ft. elevation.—Fr. March.—L.—SS. = Metam.

12. *D. gyroides*, DC.; H.f. Ind. Fl. ii. 175.—A spreading erect shrub, from a few feet up to 5 ft. high, the stems almost terete and glabrous, under favourable circumstances up to 1 $\frac{1}{2}$  in. thick, the branchlets thinly or thickly pubescent; bark thin, blackish; stipules from a broad base lanceolate, subulate-acuminate, striate, scarious; stipulets subulate, 1-1 $\frac{1}{2}$  lin. long; leaves pinnately 3- and often also 1-foliolate, on a more or less pubescent  $\frac{1}{2}$  to  $\frac{1}{2}$  in. long petiole; leaflets elliptical to obversely oval and oblong, very shortly petioluled, 1-2 in. long (the lateral ones usually small or at least smaller than the terminal one), rounded, blunt or almost retuse with or without a minute mucro, thin chartaceous, glabrescent above, more or less thinly appressed pubescent beneath; flowers middling-sized, purple, on 3 to 4 lin. long usually yellowish pilose pedicels, forming a rather short but rather crowded peduncled or almost

sessile raceme in the axils of the leaves and at the end of the terminal and axillary branchlets, the rachis tawny or yellowish villous, rather strong and often much scared; bracts very deciduous, linear-lanceolate, acuminate, striate, scarious, ciliate, about  $\frac{1}{2}$  in. long, the upper ones ovate, acute, and less ciliate; calyx shallow, more than a line across, the teeth short, 3-angular; corolla glabrous, more than  $\frac{1}{3}$  in. long; pods crowded, elongate linear-oblong, usually somewhat curved, dehiscent, densely covered with brown or tawny short stiff hairs, up to  $1\frac{1}{4}$  in. long, flat, about 10-5-jointed, the articles about  $2\frac{1}{2}$  lin. long by 3 broad or almost quadrangular, with the outer suture straight and the inner rounded, each containing a single reniform-oblong glossy-olive-coloured and black-speckled seed.

HAB.—Frequent in the mixed forests, especially along the rocky or stony beds of choungs in the upper mixed forests, from Arracan, Pegu, and Martaban down to Tenasserim.—Fl. close of R.S.; Fr. C.S.— $1 \times s.$ —SS.— $\infty$  SiS. All., etc.

REMARKS.—Wood rather heavy, close-grained, soft, pale-greyish brown, of a silvery lustre.

13. *D. heterocarpum*, DC. (*D. polycarpum*, DC.; H.f. Ind. Fl. ii. 171).—A spreading shrub, 1 to  $3\frac{1}{4}$  ft. high and higher, the younger branchlets more or less pubescent or even pilose; stipules from a broad base linear, subulate-acuminate, scarious, striate,  $\frac{1}{2}$ – $\frac{1}{2}$  in. long; stipulets subulate-filiform, about 2 lin. long; leaves pinnately 3-foliolate, on a more or less pubescent petiole  $\frac{1}{4}$  to  $\frac{3}{4}$  in. long; lateral leaflets somewhat smaller and slightly oblique, the terminal one obovate to obovate- and elliptically oblong, very shortly petioluled, blunt or rounded,  $\frac{1}{2}$  to 2 in. long, entire, chartaceous, glabrous above, beneath pale-coloured and more or less sparingly appressed pubescent or rarely pilose or silvery silk-hairy; flowers small, purple, usually with a yellow blotch at the base of the standard, on capillary puberulous about 3-2 lin. long pedicels, forming a rather short puberulous or sometimes pilose raceme at the end of the branchlets and in the axils of the leaves, the rachis usually appressed silvery pubescent; bracts very deciduous, ovate-lanceolate, subulate-acuminate, striate, fringed, 2- $2\frac{1}{2}$  lin. long; calyx glabrous, about a line long, the teeth linear-acuminate; corolla glabrous, nearly 3 lin. long; pods elongate linear-oblong, flat, glabrous, with the margins fringed, or sparingly and shortly stiff-hairy or hooked-hirsute, 3-9-jointed, the articles almost 4-angular, 1 to nearly 2 lin. long and broad, laxly net-veined, straight on the outer margin, rounded on the inner, each containing a single glossy black compressed seed.

HAB.—Common all over Burma from Chittagong and Ava to Tenasserim, in all leaf-shedding forests, especially the mixed ones; and cultivation.—Fl. close of R.S.; Fr. C.S.— $1 \times s.$ — $\infty$  SiS. All., etc.

14. *D. retroflexum*, DC.; H.f. Ind. Fl. ii. 170.—A spreading shrub, 2 to 3 ft. high, all softer parts more or less silvery silk-hairy; stipules linear-lanceolate, subulate-acuminate, striate, sparingly pilose outside, up to  $\frac{1}{2}$  in. long; stipulets subulate, 2-3 in. long; leaves pinnately 3- or more usually 1-foliolate, on an appressed pilose petiole  $\frac{1}{2}$ - $\frac{3}{4}$  in. long; leaflets of the compound leaves more obovate, of the simple ones almost orbicular, rounded or almost retuse with a mucro, entire, 1-1 $\frac{1}{2}$  in. long, chartaceous, glabrous above, beneath densely silvery appressed pilose; flowers small, purple, on filiform about 3 lin. long glabrous or nearly glabrous reflexed pedicels, forming short sessile or almost sessile appressed pilose or pubescent racemes in the axils of the leaves and at the end of axillary branchlets; bracts ovate-acuminate, cuspidate, pilose-fringed, very deciduous; calyx pilose, about a line long, the lobes lanceolate-acuminate; corolla glabrous, about 2 lin. long; pods linear-oblong, minutely puberulous or glabrous; ciliate on the margins, laxly net-veined, 3-5-jointed, the articles about 2 lin. long or somewhat shorter, straight on the outer, rounded on the inner suture.

HAB.—Tenasserim.

### ORMOCARPUM, P. B.

Calyx-tube bell-shaped, the upper teeth deltoid, the 3 lower lanceolate. Standard broad; keel much incurved, not beaked. Stamens united into 2 separate sheaths, the anthers uniform. Ovary few-ovuled; style filiform, inflexed, with a minute terminal stigma. Pod jointed, the joints turgid, indehiscant, glabrous or glandular-muricate, the basal one seedless.—Shrubs, with unpaired-pinnate leaves; stipules and bracts persistent, stipulets none. Flowers racemose.

1. *O. sennoides*, DC.; H.f. Ind. Fl. ii. 152.—An evergreen shrub, the young branchlets sticky-hairy; leaves unpaired-pinnate, 2-3 in. long, the rachis filiform, viscid-hairy; leaflets in 4-6 pairs with an odd one, very shortly petioluled, alternate, obovate or obovate-oblong, retuse,  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, membranous, glabrous; flowers long-pedicelled, middling-sized, yellow, in poor lax glandular-pubescent racemes in the axils of the leaves; calyx about 3 lin. long, sparingly viscid-hairy or almost glabrous; corolla 4 lin. long; pods moniliform-jointed, glandular-muricate, longitudinally furrowed, the joints lanceolate to linear-lanceolate, narrowed at both ends,  $\frac{1}{2}$ - $\frac{2}{3}$  in. long.

HAB.—Adjoining provinces of Siam.

\* \* *Standard always inside in bud.*

### CASSIA, L.

Sepals 5, somewhat unequal, much imbricate, the outer ones smallest, scarcely united at the base. Petals 5, spreading, nearly

equal or the lower outer ones rather larger. Stamens usually 10, free, either all nearly equal and perfect, or the 2 or 3 lower ones larger or on longer filaments and the 3 or 4 upper ones reduced to small staminodes; anthers when perfect opening in apical pores or in short lateral slits. Ovary with several ovules, incurved, tapering in a short style. Pod cylindrical or flat, indehiscient or 2-valved. Seeds oblong or obovate, transverse or horizontal. Albumen fleshy.—Trees, shrubs, or herbs, with abruptly pinnate leaves. Flowers in axillary or terminal racemes or solitary. Bracts often deciduous, bractlets none.

\* *Filaments of the lower 3 stamens very long and arcuate, the others short or imperfect. Pods terete, long, indehiscient. Seeds horizontal, transverse.*

- X Racemes drooping, destitute of bracts during flowering. Flowers yellow

*C. fistula.*

XX Racemes more or less erect, with persistent bracts. Flower pale or intensely pink-coloured. (Longer filaments node-like thickened at the middle.)

Leaflets short-acuminate

*C. nodosa.*

Leaflets pubescent, retuse or blunt

*C. renigera.*

\*\* *Perfect anthers 7 or 10, opening by terminal pores or slits. Pods compressed or more or less terete, opening along the one or both sutures.*

X Perfect stamens 7.

○ Pods not winged.

All full-grown parts glabrous; large tree

*C. Siamea.*

All parts pubescent; stipules deciduous; shrub or small tree

*C. Timoriensis.*

All parts pubescent; stipules large, lunate-reniform, rather persistent; shrub

*C. auriculata.*

○○ Pods broadly 4-winged; shrubby herb, glabrous; bracts large, yellow

*C. alata.*

XX Perfect stamens 10; pods very flat, often sinuate-constricted between the seeds

*C. glauca.*

1. *C. fistula*, L.; Bedd. Sylv. Madr. 91; Brand. For. Fl. 164.—*Gnoo-kyee*.—A tree (30—50 + 10—25 + 3—6), shedding leaves in H.S., the very young shoots silk-hairy; bark grey, about  $\frac{1}{2}$  in. thick, smooth, occasionally peeling off in mealy thin flakes; cut dryish, red; leaves abruptly pinnate, while very young appressed sericeous, 1-1 $\frac{1}{2}$  ft. long, the petiole and rachis terete; leaflets in 4-8 pairs, on thick 2-3 lin. long petioles, ovate to ovate-oblong, bluntish to bluntish acuminate, 3-5 in. long, thin coriaceous, when full grown glabrous, more or less glaucescent beneath; flowers large, yellow, on capillary 1 $\frac{1}{2}$ -2 in. long pedicels, forming long drooping glabrous slender racemes solitary or by pairs from the axils of the young leaves or from above the scars of the fallen ones; calyx very deciduous, velvety; petals obovate-oblong, about an inch long; filaments and ovary glabrous, the longer filaments not thickened at the middle; pods terete, 2-3 ft. long, at base contracted in a short stalk, black, smooth, chambered within, many-seeded; seeds ovoid, rather small, somewhat compressed, pale chestnut-brown, glossy.

HAB.—Frequent all over Burma and the adjacent provinces, in the leaf-shedding forests, especially in the savannah and lower mixed forests.—Fl. Apr.; Fr. C. S.—l.—SS.—= *or* *All. S.S.*

REMARKS.—Wood pale reddish brown, the heart-wood dark brown, rather heavy, coarse-fibrous, but rather close-grained, strong, elastic, but soon attacked by xylophages if not seasoned. 12' 57 pl. Used for boxes, sides of carts, plough-shares, rice-pounders, etc. Bark good for tanning.

2. *C. nodosa*, Ham.—*Gnon-thrin*.—A large evergreen tree, the very young shoots shortly pubescent; leaves abruptly pinnate,  $\frac{1}{2}$  to 1 ft. long, the rachis shortly puberulous; leaflets in 6-12 pairs, on a 1-2 lin. long puberulous petiolule, oblong to ovate-oblong, shortly acuminate,  $1\frac{1}{2}$  to 3 in. long, thin coriaceous, when full grown glabrous, and glossy above, beneath indistinctly and shortly puberulous; flowers large, showy, pinkish, on  $1\frac{1}{2}$ -2 in. long slender puberulous pedicels, forming erect solitary slightly puberulous short racemes solitary or by pairs in the axils of the leaves or more usually above the scars of the fallen ones; bracts persistent, pubescent, narrow-lanceolate; calyx velvety; petals oblong-lanceolate, rather acute, about an inch long; filaments glabrous, the 3 longer ones spherically thickened at the middle; ovary slightly villous; pods cylindrical, 1- $1\frac{1}{2}$  ft. long, at base contracted in a short stalk, smooth, chambered within, many-seeded.

HAB.—Evergreen tropical forests of Martaban down to Upper Tenasserim, rather rare; also Chittagong.—Fl. Apr.; Fr. C. S.—s.

3. *C. renigera*, Wall.—*Gnoo-shray*.—A leaf-shedding tree (30—40+8—15+3—5), the younger parts all softly and shortly pubescent; leaves abruptly pinnate,  $\frac{1}{2}$ -1 ft. long, softly pubescent all over; stipules large, lunate-reniform, deciduous; leaflets in 8-20 pairs, very shortly petioluled or rather almost sessile, elliptically oblong to oblong, blunt or retuse with a minute mucro,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, membranous, softly and shortly pubescent; flowers large and showy, of a rich pink colour, on pubescent 1- $1\frac{1}{2}$  in. long pedicels, forming very short softly pubescent densely bracted racemes solitary or by pairs above the scars of the fallen leaves; bracts cordate-ovate, long-acuminate, softly pubescent; calyx shortly and densely pubescent; petals oblong, nearly an inch long, bluntish; ovary and filaments glabrous, the longer filaments incrassate at the middle; pods cylindrical, 1-2 ft. long, glabrous.

HAB.—Not unfrequent in the dry forests of Prome and Ava.—Fl. Apr.; Fr. Nov.—l.—SS.—= *C.S.*

4. *C. Siamea*, Lamk.—*Maizalee*.—An evergreen or often leaf-shedding tree (50—60—10—35+3—6), remaining stunted on impermeable substrata, the young branchlets minutely downy; bark rather smooth, grey or blackish brown, slightly longitudinally fissured, brittle; leaves abruptly pinnate,  $\frac{1}{2}$ -1 ft. long, the young rachis minutely downy; leaflets in 6-10 pairs, on a puberulous or

almost glabrous petiolule about a line long, oblong to elliptically oblong, more or less retuse with a minute mucro,  $1\frac{1}{2}$ -2 in. long, entire, chartaceous, glabrous, or slightly downy and more or less glaucescent beneath; flowers rather small, yellow, on  $\frac{1}{2}$ -1 in. long puberulous pedicels, forming longer or shorter peduncled puberulous often corymb-like racemes arranged in a terminal or axillary panicle; calyx almost glabrous; petals almost rotundate, shortly clawed, about  $\frac{1}{2}$  in. long; filaments glabrous; ovary shortly pubescent; pods elongate-linear, acuminate at both ends, 3-7 in. long, flat, both sutures thickened, velvety-brown, many-seeded; seeds somewhat pentagonally elliptical, very flat, blackish brown, glossy.

HAB.—Rather frequent in the mixed (especially the upper mixed) and dry forests, from Chittagong and Ava down to Tenasserim.—Fl. Nov.-Jan.; Fr. March-Apr.—L.—SS.= $\infty$  *SiS*.

REMARKS.—Sap-wood broad, white, coarsely fibrous, light; heart-wood ebony-like and almost black, often streaked, heavy and very close-grained, durable, takes fine polish.—□=58 pd. Used for helves, walking-sticks, mallets, etc.

5. *C. Timoriensis*, DC.—*Toung-maizalee*.—An evergreen tree, (12—18+6—10+ $\frac{3}{4}$ —1), with a very spreading crown, all softer parts shortly appressed pubescent; leaves abruptly pinnate,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long, the rachis more or less pubescent; leaflets in 10-20 pairs, on a very short pubescent petiolule, oblong to narrow-oblong, blunt with a mucro, 1-1 $\frac{1}{4}$  in. long, entire, membranous, thinly appressed pubescent, more or less glabrescent above; flowers rather large, yellow, on  $\frac{1}{2}$ -1 in. long shortly pubescent pedicels, forming short pubescent bracted racemes in the axils of the upper leaves and often collected into terminal panicles; bracts leafy, broad-ovate, acute, about  $\frac{1}{2}$  in. long, pubescent, longer persistent; calyx shortly pubescent; petals rotundate-obovate, shortly clawed, nearly  $\frac{1}{2}$  an in. long, the filaments very short, glabrous; ovary glabrous; pods elongate-linear, very flat, acuminate at both ends, smooth, black, transversely and slightly torulose; seeds very flat, glossy.

HAB.—Frequent all over Burma from Ava down to Tenasserim, in the mixed and dry forests, more especially along choungs in the upper mixed forests.—Fl. Sept.-Oct.; Fr. C.S.—s  $\times$  L.—SS.= $\infty$  *SiS*.

6. *C. auriculata*, L.; Brand. For. Fl. 165.—A large shrub, 8-10 ft. high, the branchlets softly velvety pubescent; stipules large, cordate-semilunate, long-persistent; leaves abruptly pinnate,  $\frac{1}{4}$ - $\frac{1}{2}$  ft. long, the rachis shortly pubescent; leaflets in 8-12 pairs, very shortly petioluled or almost sessile, oblong, blunt with a mucro,  $\frac{3}{4}$  in. long, entire, membranous, appressed pubescent, more or less glabrescent above; flowers large, yellow, on about an inch long shortly pubescent pedicels, forming a long-peduncled softly and shortly pubescent bracted few-flowered raceme in the axils of the leaves; bracts leafy, ovate to ovate-lanceolate, acuminate, 3-4 lin.

**IIAN.**—Frequent all over Burma and the adjacent provinces, in the leaf-shedding forests, especially in the savannah and lower mixed forests.—Fl. Apr.; Fr. C.S.—1.—SS.=  $\infty$  *Alt. S.S.*

**IKMAEKA.**—Wood pale reddish brown, the heart-wood dark-brown, rather heavy, coarse-fibrous, but rather close-grained, strong, elastic, but soon attacked by xylophages if not seasoned.  $\square$  57 pd. Used for bows, axles of carts, plough-shares, rice-pounders, etc. Bark good for tanning.

2. **C. nodosa**, Ham.—*Gnoo-thein*.—A large evergreen tree, the very young shoots shortly pubescent; leaves abruptly pinnate,  $\frac{1}{2}$  to 1 ft. long, the rachis shortly puberulous; leaflets in 6-12 pairs, on a 1-2 lin. long puberulous petiolule, oblong to ovate-oblong, shortly acuminate,  $1\frac{1}{2}$  to 3 in. long, thin coriaceous, when full grown glabrous and glossy above, beneath indistinctly and shortly puberulous; flowers large, showy, pinkish, on  $1\frac{1}{2}$ -2 in. long slender puberulous pedicels, forming erect solitary slightly puberulous short racemes solitary or by pairs in the axils of the leaves or more usually above the scars of the fallen ones; bracts persistent, pubescent, narrow-lanceolate; calyx velvety; petals oblong-lanceolate, rather acute, about an inch long; filaments glabrous, the 3 longer ones spherically thickened at the middle; ovary slightly villous; pods cylindrical, 1- $1\frac{1}{2}$  ft. long, at base contracted in a short stalk, smooth, chambered within, many-seeded.

**HAB.**—Evergreen tropical forests of Martaban down to Upper Tenasserim, rather rare; also Chittagong.—Fl. Apr.; Fr. C. S.—s.

3. **C. renigera**, Wall.—*Gnoo-shway*.—A leaf-shedding tree (30—40+8—15+3—5), the younger parts all softly and shortly pubescent; leaves abruptly pinnate,  $\frac{1}{3}$ -1 ft. long, softly pubescent all over; stipules large, lunate-reniform, deciduous; leaflets in 8-20 pairs, very shortly petioluled or rather almost sessile, elliptically oblong to oblong, blunt or retuse with a minute mucro,  $\frac{1}{2}$ - $1\frac{1}{2}$  in. long, membranous, softly and shortly pubescent; flowers large and showy, of a rich pink colour, on pubescent  $1$ - $1\frac{1}{2}$  in. long pedicels, forming very short softly pubescent densely bracted racemes solitary or by pairs above the scars of the fallen leaves; bracts cordate-ovate, long-acuminate, softly pubescent; calyx shortly and densely pubescent; petals oblong, nearly an inch long, bluntish; ovary and filaments glabrous, the longer filaments incrassate at the middle; pods cylindrical, 1-2 ft. long, glabrous.

**HAB.**—Not unfrequent in the dry forests of Prome and Ava.—Fl. Apr.; Fr. Nov.—1.—SS.—CaS.

4. **C. Siamea**, Lamk.—*Maizalee*.—An evergreen or often leaf-shedding tree (50—60—10—35+3—6), remaining stunted on impermeable substrata, the young branchlets minutely downy; bark rather smooth, grey or blackish brown, slightly longitudinally fissured, brittle; leaves abruptly pinnate,  $\frac{1}{2}$ -1 ft. long, the young rachis minutely downy; leaflets in 6-10 pairs, on a puberulous or

almost glabrous petiolule about a line long, oblong to elliptically oblong, more or less retuse with a minute mucro,  $1\frac{1}{2}$ -2 in. long, entire, chartaceous, glabrous, or slightly downy and more or less glaucescent beneath; flowers rather small, yellow, on  $\frac{1}{2}$ -1 in. long puberulous pedicels, forming longer or shorter peduncled puberulous often corymb-like racemes arranged in a terminal or axillary panicle; calyx almost glabrous; petals almost rotundate, shortly clawed, about  $\frac{1}{2}$  in. long; filaments glabrous; ovary shortly pubescent; pods elongate-linear, acuminate at both ends, 3-7 in. long, flat, both sutures thickened, velvety-brown, many-seeded; seeds somewhat pentagonally elliptical, very flat, blackish brown, glossy.

HAB.—Rather frequent in the mixed (especially the upper mixed) and dry forests, from Chittagong and Ava down to Tenasserim.—Fl. Nov.-Jan.; Fr. March-Apr.—L.—SS.= $\infty$  S/S.

REMARKS.—Sap-wood broad, white, coarsely fibrous, light; heart-wood ebony-like and almost black, often streaked, heavy and very close-grained, durable, takes fine polish.—□'=58 pd. Used for helves, walking-sticks, mallets, etc.

5. *C. Timoriensis*, DC.—*Toung-maizalee*.—An evergreen tree, (12—18+6—10+ $\frac{3}{4}$ —1), with a very spreading crown, all softer parts shortly appressed pubescent; leaves abruptly pinnate,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long, the rachis more or less pubescent; leaflets in 10-20 pairs, on a very short pubescent petiolule, oblong to narrow-oblong, blunt with a mucro, 1-1 $\frac{1}{4}$  in. long, entire, membranous, thinly appressed pubescent, more or less glabrescent above; flowers rather large, yellow, on  $\frac{1}{2}$ -1 in. long shortly pubescent pedicels, forming short pubescent bracted racemes in the axils of the upper leaves and often collected into terminal panicles; bracts leafy, broad-ovate, acute, about  $\frac{1}{2}$  in. long, pubescent, longer persistent; calyx shortly pubescent; petals rotundate-obovate, shortly clawed, nearly  $\frac{1}{2}$  an in. long, the filaments very short, glabrous; ovary glabrous; pods elongate-linear, very flat, acuminate at both ends, smooth, black, transversely and slightly torulose; seeds very flat, glossy.

HAB.—Frequent all over Burma from Ava down to Tenasserim, in the mixed and dry forests, more especially along choughs in the upper mixed forests.—Fl. Sept.-Oct.; Fr. C.S.—s  $\times$  1.—SS.= $\infty$  S/S.

6. *C. auriculata*, L.; Brand. For. Fl. 165.—A large shrub, 8-10 ft. high, the branchlets softly velvety pubescent; stipules large, cordate-semilunate, long-persistent; leaves abruptly pinnate,  $\frac{1}{2}$ - $\frac{1}{2}$  ft. long, the rachis shortly pubescent; leaflets in 8-12 pairs, very shortly petioluled or almost sessile, oblong, blunt with a mucro,  $\frac{3}{4}$  in. long, entire, membranous, appressed pubescent, more or less glabrescent above; flowers large, yellow, on about an inch long shortly pubescent pedicels, forming a long-peduncled softly and shortly pubescent bracted few-flowered raceme in the axils of the leaves; bracts leafy, ovate to ovate-lanceolate, acuminate, 3-4 lin.

long, long-persistent; calyx glabrous or nearly so, the sepals ciliate; petals obovate-rounded, shortly clawed, nearly an inch long; filaments glabrous; ovary shortly appressed pubescent; pods brown, 2-3 in. long, linear-oblong, at base narrowed in a short stalk, terminating in a long filiform style, very flat, shortly and rather thinly pubescent, 2-valved, the valves chartaceous, somewhat torose.

HAB.—Apparently frequent in the Irrawaddi valley of Ava.—Fl. Sept.-Febr.

7. *C. glauca*, Lamk; Bedd. Sylv. Madr. 91.—A large branchy shrub, 4-6 ft. high, the younger parts more or less appressed pubescent or rarely almost glabrous; leaves abruptly pinnate,  $\frac{1}{2}$ -1 ft. long, the rachis more or less silky pubescent; leaflets in 4-10 pairs, on very short puberulous petiolules, from oblong to oval-oblong, bluntish or rounded,  $\frac{1}{2}$  to 2 in. long, entire, membranous, glabrous above, beneath more or less glaucous and usually also more or less appressed pubescent or rarely quite glabrous; flowers middling-sized, yellow, on filiform puberulous up to an inch long pedicels, forming puberulous corymb-like racemes in the axils of the leaves or collected at the end of the branchlets; bracts small, lanceolate, acuminate, long-persistent; calyx glabrous or nearly so; petals elliptically oblong, nearly an inch long; filaments glabrous; ovary silky pubescent; pods very flat and often sinuate-constricted, elongate-linear-oblong, at the rounded base constricted in a short stalk, blunt and terminated with a stylose bristle, 2-4 in. long, many-seeded, the valves black, thin coriaceous, transversely torulose, smooth; seeds flat, oblong, glossy brown.

HAB.—Not unfrequent in the dry forests, especially along the sides of rivers, of Ava and Prome; also much planted round Khyoungs in Pegu, etc.—Fl. Fr.  $\infty$ .—l.—SS. =  $\infty$ .

### BAUHEINIA, L.

Sepals united at the base into a short or long disk-bearing tube, the free part separating into 5 or fewer valvate or induplicate lobes. Petals 5, inserted at the summit of the tube, usually clawed and more or less unequal. Stamens 10, free, either all perfect or some reduced to small staminodes. Ovary stalked (the stalk adnate to the one side of the calyx-tube) with several ovules; style usually filiform rarely short with a capitate broad or oblique terminal stigma. Pod linear or oblong, compressed, 2-valved. Seeds compressed. Albumen usually thin.—Trees or woody climbers, rarely erect shrubs, with either bifoliate leaves or more usually the 2 leaflets united into one entire or 2-lobed palmately nerved blade. Flowers large or small, in terminal or rarely axillary often corymb-like racemes sometimes collected in a panicle.

\* *Erect trees or shrubs.*

× Calyx spatulate.

○ Fertile stamen 1 only, the rest sterile.

Young shoots pubescent; leaves puberulous; ovary stalked; pods unknown . . . . . *B. monandra.*

As former, pods sessile . . . . . *B. brachycarpa.*

○○ Fertile stamens 5.

Shrub; calyx  $\frac{1}{2}$  in. long . . . . . *B. acuminata.*

Shrub; calyx only 3 lin. long . . . . . *B. polycarpa.*

Tree; calyx  $\frac{1}{2}$  in. long . . . . . *B. variegata.*

○○○ All the 10 stamens fertile; flowers small . . . . . *B. racemosa.*

×× Calyx valvate, the segments reflexed and free, or only slightly cohering.

○ Stamens 10, 5, or more of them sterile. Calyx in bud angular. Flowers large and showy.

Leaves glabrous; flowers white or purple, the broader petal usually yellow at base . . . . . *B. purpurea.*

Leaves velvety; flowers yellow, turning orange . . . . . *B. elongata.*

○○ All the 10 stamens fertile; stigma peltate; flowers small . . . . . *B. Malabarica.*

\* \* *Woody climbers, often tendril-bearing. Calyx valvate in bud.*

× Leaves 2-foliate; all 10 stamens fertile; calyx angular in bud . . . . . *B. diphylla.*

×× Leaves more or less deeply 2-lobed. Calyx terete in bud.

○ Ovary and pod glabrous. Calyx-tube and style elongate.

+ Ovary stalked.

Bractlets very large, almost leafy . . . . . *B. involucrata.*

++ Ovary sessile. Flowers small, corymbose.

Lobes of leaves rounded; pedicels and calyx glabrous . . . . . *B. glauca.*

Lobes of leaves acuminate; pedicels and calyx appressed silk-hairy . . . . . *B. piperifolia.*

○○ Ovary, and usually also the pod, villous, pubescent or puberulous.

+ Pod and ovary sessile.

+ Lobes of leaves acuminate to acute and bluntish; leaves glabrous.

Racemes elongate, appressed silk-hairy; pedicels stout . . . . . *B. macrostachya.*

Racemes corymb-like contracted, sparingly puberulous; pedicels slender . . . . . *B. ornata.*

++ Lobes of the tomentose or pubescent leaves rounded.

All parts brown-tomentose or pubescent; petals an inch long; racemes elongate . . . . . *B. Takhii.*

++ Pod and ovary stalked.

Flowers rose-coloured, in corymb-like racemes; style shorter than the ovary, villous, thick . . . . . *B. rosea.*

Flowers yellowish white to yellow, in short racemes; style elongate and slender . . . . . *B. ferruginea.*

○○○ Ovary and pod glabrous; calyx-tube almost none, the lobes tooth-like; style very short . . . . . *B. anguina.*

\* *Erect trees or shrubs.*

1. *B. monandra*, Kz.—*Swai-tan*.—Probably an erect shrub or tree, the young shoots shortly pubescent; leaves small, very like those of *B. tomentosa*, rotundate-oval, truncate at the base, on a shortly pubescent petiole  $\frac{1}{2}$ -lin. long, down to  $\frac{1}{3}$  2-lobed, with the

lobes rounded and bearing a bristle in their sinus, 1-1½ in. long, entire, chartaceous, glabrous above, beneath (especially along the 11 palmate nerves) shortly pubescent; flowers rather large, white (?), with the lower petal spotted, on 1-1½ in. long shortly but densely pubescent pedicels, forming short terminal pubescent racemes; bracts subulate, small; calyx shortly tomentose outside, spindle-shaped in bud, spathaceous; petals obovate-cuneate, about 1½ in. long, glabrous, waved; perfect stamen 1 only, all others rudimentary; ovary stalked, tawny villous (the sutures smooth and glabrous), terminated by a slender style twice as long as the ovary itself.

HAB.—Martaban.

2. *B. brachycarpa*, Wall.—“Glabrous or minutely scabrous-puberulous; leaflets connate to ¾ of their length, oval, blunt, parallelly 4-5-nerved, on an angular petiole; racemes short, many-flowered; flowers pedicelled; pods sessile, broadly linear, acuminate, minutely tomentose; flowers unknown.” (Accord. Benth.)

HAB.—Avà.

3. *B. acuminata*, L.—*Ma-ha-hlay-ka-phoo*.—An erect shrub, 2-6 ft. high, the young shoots slightly pubescent; leaves cordate-rotundate, 2-cleft to about ½ of their length, with the lobes acute or bluntish, with or without a short bristle in their sinus, on a 1-1½ in. long usually glabrous petiole, 2-4 in. long and nearly as broad, entire, chartaceous, glabrous above, beneath conspicuously transversely veined and net-veined, minutely puberulous; flowers large, showy, pure white, or sometimes the base of the petals yellow, on ½-1 in. long indistinctly pubescent glabrescent subulate-bracted pedicels, forming short, more or less corymb-like, leaf-opposed and terminal, almost glabrous racemes; bracts subulate; calyx minutely and sparingly appressed pubescent, spathaceous, about ½ an in. long, long-acuminate and setaceously 5-toothed, terete in bud; petals more or less oblong, nearly an inch long, glabrous; stamens 10, 5 longer; pods linear-lanceolate, contracted in a slender ½-¾ in. long stalk, laterally acuminate, 2-3 in. long, glabrous, rather flat, pale-brown, slightly torose, along the seed-bearing suture broader and thickened into 2 marginal keels, 8-12-seeded; seeds oblong to ovoid, somewhat compressed, brown, glossy.

HAB.—Frequent in the open forests, especially the Eng forests, all over Burma.—Fl. March-May; Fr. C.S.—L.—SS.—Dil. Arg.

4. *B. polycarpa*, Wall.—A simple or almost simple shrub, 1-3 ft. high, glabrous or the young shoots slightly and sparingly appressed-pubescent; leaves more or less cordate-rotundate, 2-lobed up to ½ of their length, with the lobes rounded or somewhat acute and a short bristle in their sinus, on a slender 1-1½ in. long petiole,

3-5 in. long, palmately 7-9-nerved, entire, thin chartaceous, glabrous, somewhat glaucescent beneath; flowers small, white, on hardly a line long pedicels forming a very slender minutely pubescent leaf-opposed raceme; bracts minute, acute; calyx glabrous, sacate-spathaceous, acute to acuminate, only 3 lin. long, terete in bud; petals nearly conform, concave, obovate-oblong, retuse, erect-conviving, sessile, glabrous; stamens 10, 5 of them doubly longer; pods linear-lanceolate, acuminate at the base, almost sessile, 1-2½ in. long, flat, smooth or slightly wrinkled-nerved, the seed-bearing suture narrow, 2-sulcate, 4-6-seeded; seeds oblong, small, glossy-black.

HAB.—Frequent in the upper mixed forests from Pegu and Martaban down to Upper Tenasserim.—Fl. Apr.-May; Fr. C.S.—1.—SS.= SiS. Metam.

5. *B. variegata*, L.; Bedd. Sylv. Madr. 92; Brand. For. Fl. 160.—*Burê-cheng*.—A tree (25—30+6—15+2—4), leafless in H.S., the young branchlets puberulous; leaves cordate-rotundate, 2-cleft to ½-½ of their length, with the lobes rounded and a short subulate bristle in their sinns, 2-4 in. long, on a ½-1 in. long geniculate-thickened petiole at summit, entire, glabrous, palmately 9-11-nerved; flowers large and showy, pale purplish to white with the larger petal often orange to yellow or purplish blotched, on strong up to ½ an in. long naked (not bracted) velvety-tomentose pedicels, arranged into a very short minutely bracted corymb-like velvety raceme above the scars of the fallen leaves and at the end of the branchlets; calyx slit, spathaceous, about ½ an in. long, terete in bud, the apex indistinctly 5-toothed; petals about an inch long or longer, from broadly ovate-oblong to lanceolate, strongly nerved, acute to acuminate, glabrous; fertile stamens 5; pods linear-lanceolate, narrowed in a 1-¼ in. long stalk, acuminate, 4-6 in. long, glabrous and rather smooth or minutely obliquely wrinkled, black, many-seeded; seeds ovoid, rather flat, pale-coloured.

HAB.—Common in the dry forests, especially the upper ones, of Prome and Ava, up to 3,200 ft. elevation; also Yoonzeleen, Martaban.—Fl. Febr.-March; Fr. C.S.—1.—SS.= CaS.

6. *B. racemosa*, Lamk.; Bedd. Sylv. Madr. t. 182; Brand. For. Fl. 159.—*Hpalan*.—A tree (25—30+8—15+3—4), shedding leaves in H.S., the young shoots tawny pubescent; leaves broadly cordate-rotundate, on a ½-1 in. long pubescent petiole, shortly 2-lobed, with the lobes rounded and a bristle in their sinus, 1-3 in. long, entire, chartaceous, beneath slightly appressed pubescent, more or less glabrescent and glaucescent; flowers small, white, on 2-3 lin. long pubescent pedicels, forming softly and shortly pubescent racemes at the end of the branchlets; bracts minute; calyx shortly pubescent, the tube short and hemispherical, the lobes in bud ovate-acute,

almost torate, spathaceously opening, about 3 lin. long; petals linear-lanceolate, acute, very unequal, the lower longer one about 5 lin. long, slightly pubescent; ovary glabrous; pods more or less curved, elongate-linear-oblong, tapering in a short stalk, thick, but rather flat,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long, woody coriaceous, glabrous, black; seeds oval, brown, shining.

HAB.—Common in the dry forests of Prome, entering also the savannah forests.—Fl. March, April.—SS. = CnS. All.

REMARKS.—Wood dark brown, mottled, rather light, fibrous, but rather close-grained; the heart-wood very hard; takes fine polish.  $\square' = 41$  pd. Bark used for slow matches by matchlockmen in India; ropes can also be made from it.

7. *B. purpurea*, L.; Bedd. Sylv. Madr. 92; Brand. For. Fl. 160.—*Ma-ka-lay-ka-nce*.—A tree (25—30+8—10+2—3), leafless in H.S., glabrous, or the young branchlets minutely velvety; leaves more or less cordate-rotundate, to the middle 2-cleft, with the lobes blunt and subulate-pointed in the sinns, on a 1-2 in. long glabrous petiole thickened at the apex, 3-4 in. long and nearly as broad, 5-7-nerved, chartaceous, glabrous; flowers rather large and showy, from purple to bluish white, the anterior petal often with a yellowish blotch at base, on 3 to 5 lin. long minutely bracted tawny velvety pedicels, forming terminal or rarely also axillary simple or branched tawny velvety racemes; calyx tawny velvety, angular in bud, the tube 3-4 lin. long and very narrow, the lobes somewhat constricted at the base and opening usually variously into 2 unequal  $\frac{3}{8}$  in. long sheaths; petals from obovate-lanceolate to almost lanceolate, waved, more or less acute, about an inch long or longer, glabrous; ovary appressed tawny villous; fertile stamens 3 or 4; pods elongate-linear, 5-6 in. long, tapering into an inch long stalk, acuminate, glabrous, black, almost smooth, many-seeded; seeds compressed, ovoid, pale-brown.

HAB.—Here and there cultivated in Ava and Pegu.—Fl. C.S.

8. *B. elongata*, Korth.—An evergreen tree, about 20-30 ft. high, all softer parts velvety; leaves cordate-rotundate, 2-lobed to  $\frac{1}{2}$ - $\frac{3}{4}$  of their length, with the lobes rounded and a short bristle in their sinus, on a  $\frac{1}{2}$ -1 in. long more or less puberulous petiole, 2 $\frac{1}{2}$ -4 in. long and broad, entire, chartaceous, minutely velvety all over, palmately 11-13-nerved; flowers middling-sized, yellow, turning orange, on  $\frac{1}{2}$ -1 in. long sulcate strong velvety pedicels, forming a short velvety raceme opposite the leaves and at the end of the branchlets; bracts minute; calyx about an inch long, velvety, 5-angular in bud, the lobes linear, more or less separating into 4 cohering and a single free sepal and reflexed; petals about an inch long or longer, linear-lanceolate to lanceolate, acuminate, long-tapering at the base, sparingly puberulous; pods oblong-lanceolate, laterally acuminate, narrowed into a stalk, 2-3 in. long, brown, pubescent.

HAB.—In the tropical forests above Rangoon, and Tenasserim down to Tavoy.  
—Fl. Decr.-Jan.—s.

9. *B. Malabarica*, Roxb.; Bedd. Sylv. Mndr. 92; Braud. For. Fl. 159.—An evergreen tree (30—40 + 12—20 + 5—6), the very young shoots minutely puberulous; bark rough, dark-grey or brownish; cut red; leaves more or less rotundate-cordate, on a puberulous glabrescent petiole 1-1½ in. long, shortly 2-lobed, with the lobes rounded and a bristle in their sinus, 2½-3 in. long and rather broader, entire, chartaceous, glabrous, somewhat glaucous beneath, usually palmately 9-nerved; flowers small, white, on slightly puberulous 3-4 lin. long pedicels, forming short minutely bracted puberous simple or branched racemes in the axils of the leaves and at the end of the branchlets; calyx minutely puberous, the tube conical and short, the limb 5-toothed, ovoid in bud; petals glabrous, somewhat longer than the calyx, obovate-cuneate, about 3 lin. long; ovary and the short style tawny-tomentose, the latter terminated by a large peltate stigma; pods 1-1½ ft. long, linear, acuminate at both ends and narrowed into an inch long stalk, very flat and often bullate-undulate, strongly and conspicuously net-veined, glabrous, blackish, coriaceous, many-seeded; seeds small, blackish-brown, ovoid-oblong.

HAB.—Frequent in the upper and lower mixed forests of the Pegu Yomah, rarely entering the savannah forest.—Fl.-Fr. C. S.—1.—SS.=SiS. All.

REMARKS.—Wood used for the cross-pieces of harrows, house-posts, etc.

\* \* *Woody climbers, often tendril-bearing.*

10. *B. diphylla*, Symes.—A large tendril-bearing, scandent shrub, all parts quite glabrous; leaves on a ½-1 in. long petiole (the bristle seated on the back of the thickened apex), 2-foliate down to the base; leaflets unequally oval-oblong, more or less truncate at the base, rounded at the apex, sessile, 1-3 in. long, 5-6-nerved, thin coriaceous, glabrous, a little glaucous beneath; flowers large, white, on strong 1-2 in. long pedicels, forming a terminal robust glabrous raceme at the end of the branchlets; calyx glabrous, about an inch long or somewhat longer, the lobes in bud elongate-oblong, then linear-oblong and free to nearly one-half of their length, reflexed, separating in an obliquely cut tube; petals about ¼ longer than the sepals, linear-lanceolate, tapering, undulate; stamens 10, all perfect; ovary smooth; pods very flat, elongate-oblong, rather chartaceous, varying from ½ to 2 ft. in length by 1-2½ in. broad, with somewhat thickened borders contracted in a 1-2 in. long stalk, transversely but thinly net-veined, glabrous, brown; seeds between pithy partitions, oblong, slightly compressed, brown, smooth and glossy.

HAB.—Frequent in the dry forests of Ava and Prome.—Fl. R.S.; Fr. ∞—1.—SS.=CaS.

11. *B. involuclata*, Kz.—A scandent shrub, the young shoots slightly puberous; leaves cordate-ovate, on a glabrous  $1\frac{1}{2}$ -2 in. long petiole, 2-lobed to  $\frac{1}{2}$ - $\frac{2}{3}$  of their length, with the lobes bluntish acuminate and a bristle in their sinus, 3-4 in. long, entire, thin chartaceous, glabrous, palmately 9-11 nerved; flowers rather large, pale rose-coloured, on  $2\frac{1}{2}$  in. long shortly puberulous glabrescent pedicels conspicuously 2-bracteole below the apex and forming a longer or shorter terminal puberulous glabrescent raceme; bracts minute, indistinct; bractlets below the calyx elliptically oblong, bluntish,  $\frac{1}{2}$  in. long, velvety inside, forming a 2-leaved involuclum to each flower; calyx velvety, the tube tubular, sulcate, about 3 lin. long or longer, the lobes in bud oblong-ovate, lanceolate, acuminate,  $\frac{1}{2}$  in. long, all separating and afterwards reflexed; petals nearly  $1\frac{1}{2}$  in. long, the blade ovate-oblong, blunt, as long as the claw; ovary smooth, the style rather long, but thick; fertile stamens 3.

HAB.—Martaban.

12. *B. glauca*, Wall.—A scandent evergreen shrub, the young shoots appressed rusty pubescent; leaves rotundate-oval, 2-lobed to more than  $\frac{1}{2}$  of their length, with the lobes rounded and a bristle in their sinus, on a slender about  $1\frac{1}{2}$  in. long while young slightly pubescent petiole, 2-3 in. long and broad, entire, chartaceous, glabrous, while young slightly rusty pubescent along the 9-11 palmate nerves and somewhat glaucescent beneath; flowers small, on very slender about  $\frac{1}{2}$  in. long minutely puberous 2-bracteolate pedicels, forming a corymb-like longer or shorter peduncled minutely rusty puberulous bracted raceme lateral or at the end of the branchlets; bracts setaceous; calyx glabrous, the tube cylindrical, about  $\frac{1}{2}$  an in. long, the lobes globular in bud, ovate, about 2 lin. long, reflexed; petals obovate, glabrous or slightly pubescent outside, about 3 lin. long; ovary smooth; pods broadly oblong, very flat, chartaceous, 5-8 in. long by 2 broad, with somewhat thickened sutures, contracted in a very short stalk, glossy black, and slightly transversely nerved.

HAB.—Tropical forests above Rangoon; Tenasserim, apparently frequent. —Fl. March-June; Fr. Febr.

13. *B. piperifolia*, Roxb.—A large scandent evergreen shrub, the very young shoots minutely puberous; leaves cordate-ovate, 2-lobed down to  $\frac{1}{3}$  of their length, with the lobes converging, bluntish acuminate and a short bristle in their sinus, on a  $\frac{1}{2}$ - $1\frac{1}{4}$  in. long puberous or glabrous petiole, 3-4 in. long, thin chartaceous, entire, glabrous or slightly pubescent along the palmate 7-9 nerves beneath, turning black and glossy in drying; flowers white, rather small, on slender  $1\frac{1}{4}$  in. long tawny silk-hairy pedicels, forming corymb-like bractless tawny silk-hairy racemes in the axils of the upper leaves and often several together collected in a sort of terminal corymb; calyx in bud

globular, tawny-silk-hairy, the limb deeply 5-lobed, the lobes afterwards reflexed into 2 bilobulate and 1 simple segments; petals rotundate-obovate, undulate, about  $2\frac{1}{2}$  lin. long, densely rusty villous; perfect stamens 3; ovary smooth; pods, according to Roxburgh, round or oval, glabrous, 1- to 2-seeded.

HAB.—Tenasserim.

14. *B. macrostachya*, Wall.—A large evergreen scandent shrub, all parts glabrous or the young shoots indistinctly puberulous; leaves cordate to cordate-ovate, 2-lobed down to  $\frac{1}{4}$ - $\frac{1}{3}$  of their length (the lobes bluntish acuminate, rather remote, and a short bristle in their sinus) on a  $1-1\frac{1}{2}$  in. long petiole, entire, 3-4 in. long, thin chartaceous, palmately 7-11-nerved, glabrous or slightly puberulous on the nerves beneath; flowers rather small, white, on  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long tawny mealy-velvety pedicels, forming a longer or shorter at the base usually tendril- and leaf-bearing raceme in the axils of the upper leaves and often collected in a more or less ample tawny-velvety panicle; bracts minute, acute; calyx tawny-velvety, about 2 lin. deep, shortly 5-lobed, the lobes blunt, in bud almost spherical; petals densely villous-velvety, rotundate, clawed, about 3 lin. long; ovary densely rusty-villous; pods oblong, very shortly stalked, acute, flat, shortly rusty or tawny-velvety.

HAB.—Burma, without locality.

15. *B. ornata*, Kz.—*Myouk-klay-ka*.—A large evergreen scandent shrub, the young shoots rusty-pubescent; leaves cordate-ovate to cordate-rotundate, on a  $1\frac{1}{2}$ -3 in. long petiole while young rusty pubescent, 2-lobed down to  $\frac{1}{2}$ - $\frac{2}{3}$  of their length (the lobes bluntish to bluntish acuminate and a bristle in their sinus), 4-7 in. long and nearly as broad, entire, chartaceous, while young slightly appressed pubescent beneath, soon quite glabrescent, palmately 11-15-nerved; flowers small, white, on slender  $1-1\frac{1}{2}$  in. long rusty-pubescent pedicels, crowded and forming a longer or shorter peduncled bracted tawny pubescent corymb-like raceme arising laterally or at the end of the branchlets; bracts linear-lanceolate, pubescent, about 2 lin. long; calyx in bud pyriform, appressed pubescent, the lobes ovate, about 3 lin. long, reflexed; petals obovate-oblong, slightly pubescent outside, slightly waved, about 4 lin. long; ovary tawny villous, the style long and slender, glabrous.

HAB.—Frequent in the tropical forests along choungs, along the eastern slopes of the Pegu Yomah.—Fl. Febr.—s: L.—SS.—SiS.

16. *B. VahlII*, WA.; Brand. For. Fl. 161.—A large tendril-bearing scandent shrub, all softer parts rusty-pubescent; leaves cordate-rotundate, 2-lobed down to  $\frac{1}{2}$ - $\frac{2}{3}$  of their length (the lobes rounded and a longer or shorter bristle in their sinus), 3-5 in. long and broad,

on a rusty-pubescent petiole 1-3 in. long, entire, chartaceous, above slightly, beneath densely rusty-pubescent, palmately 11-13-nerved; flowers rather large, white, turning yellowish, on slender  $1\frac{1}{2}$ -2 in. long rusty-pubescent pedicels, forming a corymb-like shorter or longer peduncled rusty or tawny villous raceme at the end of the branchlets; bracts linear-lanceolate, acuminate; calyx appressed pubescent, terete and ovoid in bud, the tube tubular, the lobes ovate-lanceolate, about  $\frac{1}{4}$  lin. long, reflexed into 2 unequally cohering spathes; petals nearly an inch long, long-clawed, obovate, crisped-waved, slightly pubescent outside; ovary villous, the long slender style glabrous; pods obovate-oblong, about  $\frac{1}{2}$ -1 ft. long by nearly 2 in. broad, flat, almost sessile, woody, shortly tawny or rusty tomentose; seeds very flat, large.

HAB.—Upper Tenasserim.

17. *B. rosea*, Kz.—A scandent shrub, the younger parts shortly tawny pubescent; leaves cordate-rotundate, 2-lobed to about  $\frac{1}{2}$  of their length (the lobes rounded and a short bristle in their sinns) on a  $1\frac{1}{2}$  to 2 in. long puberulous petiole, 3-5 in. long and nearly as broad, entire, chartaceous, while young fugaceously puberulous above, beneath shortly tawny puberulous; flowers rather small, rose-coloured, on slender appressed puberulous  $1\frac{1}{2}$ -2 in. long pedicels, forming a bracted corymb-like tawny puberous raceme at the end of the branchlets; bracts linear-lanceolate, acuminate, about 4 lin. long; calyx tawny appressed puberulous, with a short tube, in bud terete-ovoid, the lobes all separating and reflexed, 4 lin. long, linear-lanceolate; petals long-clawed, obovate-linear, waved, slightly appressed pubescent on both sides, about  $\frac{2}{3}$  in. long; ovary along with the thick short style (shorter than the ovary) tawny villous.

HAB.—Martaban, in the Eng forests of Káymapyo choong.—Fl. May.

18. *B. ferruginea*, Roxb.—A large evergreen scandent shrub, the young parts softly appressed rusty pubescent; stipules oboval, appressed pubescent, deciduous; leaves more or less cordate-rotundate, 2-lobed down to  $\frac{1}{2}$ , with the lobes rounded and bearing a short bristle in their sinus, on a  $\frac{1}{2}$ -1 in. long petiole which is rusty villous while young, 2-3 in. long and nearly as broad, entire, chartaceous, while young appressed rusty-pubescent, soon glabrescent and somewhat glaucous beneath, palmately 5-15-nerved; flowers rather large, yellowish white to yellow, sometimes tinged with orange, on strong slightly pubescent bractless pedicels up to  $\frac{1}{2}$  an in. long, forming a rather short terminal pubescent and glabrescent raceme; calyx minutely tawny puberulous, the tube nearly  $\frac{1}{2}$  an in. long, somewhat sulcate-cylindrical, in bud somewhat angular and elongate, the lobes linear-lanceolate, acute, about  $\frac{3}{4}$  in. long; petals linear-lanceolate, long-tapering at the base, rusty appressed-villous outside;

Pods elongate-oblong-lanceolate, long-stalked, nearly  $\frac{1}{2}$  a ft. long by  $1\frac{1}{2}$  in. broad, flat, shortly rusty pubescent.

HAB.—Tropical forests of the Martaban hills east of Tounghoo, at 2,000 to 3,000 ft. elevation.—SS.—Metam.

19. *B. anguina*, Roxb.—A lofty evergreen scandent shrub, the stems ribbon-like compressed, serpentine and fluted, glabrous, or the very young shoots slightly appressed rusty pubescent; bark brown, rather smooth; leaves cordate-ovate, simple, with a short bluntish 2-lobed apex, or down to  $\frac{1}{3}$ — $\frac{1}{4}$  of their length 2-lobed (the lobes bluntish acuminate and a bristle in their sinus) on a 1-2 $\frac{1}{2}$  in. long petiole, 2-6 in. long, entire, chartaceous, when full grown quite glabrous; flowers minute, white, on slender puberous 2-3 lin. long pedicels forming puberulous racemes usually arranged into terminal panicles; bracts or bractlets none; calyx glabrous or nearly so, without a tube, urceolate-cup-shaped, unequally 5-toothed, nearly a line in diameter; petals glabrous, obovate, about a line long; ovary glabrous; pods 1-1 $\frac{1}{2}$  in. long, 1-2-seeded, oblong, flat, acute at both ends and narrowed into a slender but very short stalk, glabrous.

HAB.—Not unfrequent in the tropical forests of Martaban east of Tounghoo; also Chittagong.—s: l.—SS.—Metam.

REMARKS.—Wood coarse-fibrous, brown, perishable.

## PARKINSONIA, L.

Calyx 5-cleft nearly to the base, the segments almost equal, slightly imbricate in the bud. Petals 5, 4 of them almost sessile, the fifth anticonous one-clawed and standard-like. Stamens 10, free, scarcely declinate; anthers conform. Ovary narrowed at the base, with 8-15 ovules; style almost filiform with a minute terminal stigma. Pod narrow-linear, usually slightly constricted between the distant seeds, indehiscent, 1-8-seeded. Seeds albuminous.—Trees or shrubs, usually armed with sharp thorns, the leaves sessile or nearly so, 2-pinnate, the rachis flat and much dilated, the leaflets minute or quite suppressed. Flowers rather small, in axillary racemes. Bracts very deciduous.

1. *P. aculeata*, L.; Bedd. Sylv. Madr. 91, t. 13, f. 2; Brand. For. Fl. 158.—An evergreen tree (25—30+8—15+3—4), the branches armed with paired, straight, sharp stipular thorns, all parts quite glabrous; leaves sessile, 2-pinnate, and appearing as if consisting of 2 elongate flattened slightly repand rachises of 1-2 ft. in length, which are more or less sparingly and interruptly beset with minute almost sessile oblong-lanceolate acute leaflets or the latter often enough quite aborted; flowers rather small, yellow, on capillary long pedicels up to an inch long, forming glabrous racemes in the

axils of the leaves; calyx glabrous; pods  $1\frac{1}{2}$ -4 in. long, linear, acuminate at both ends, slightly moniliform, glabrous, longitudinally nerved.

HAB.—Frequently cultivated in Ava and the Prome district, and sometimes half-spontaneous in neglected village-woods, etc.—Fl. Fr. nearly  $\infty$ , especially C. and H.S.—SS.=CaS. Ca. All.

### POINCIANA, L.

Calyx-tube short-turbinate, persistent; segments 5, nearly equal valvate in bud, deciduous. Petals 6, nearly equal, clawed, imbricate. Stamens 10, free, declinate; anthers conform. Ovary sessile or narrowed at the base, with many ovules; style filiform with a terminal somewhat dilated stigma; pods flat, 2-valved, several to many-seeded. Albumen thin.—Unarmed trees, with abruptly bipinnate leaves. Stipulets none. Flowers showy, in terminal corymb-like racemes.

1. *P. regia*, Boj.; Bedd. Sylv. Madr. 91.—A tree (30—40 + 8—15 + 3—5), evergreen or shedding leaves for a very short period in H.S., the very young shoots appressed silk-hairy, leaves abruptly bipinnate,  $\frac{1}{2}$ -1 ft. long or somewhat longer, with 8 to 15 pairs of pinnae, while young somewhat appressed silk-hairy; leaflets in 15-20 pairs, almost sessile, oblique at the base, linear-oblong, blunt,  $\frac{1}{2}$ - $\frac{1}{2}$  in. long, when full grown glabrous, membranous; flowers large, crimson to scarlet, on  $1-2\frac{1}{2}$  in. long pedicels, forming short glabrous corymb-like racemes at the end of the branchlets; calyx smooth, the lobes oblong-lanceolate, acute, nearly an inch long; petals waved, very large; filaments slightly pubescent at the base; ovary almost glabrous; pods  $1-2\frac{1}{2}$  ft. long, broadly linear, flat, sessile, obliquely acuminate, glabrous, many-seeded; seeds  $\frac{3}{4}$  in. long, almost cylindrically oblong and only slightly compressed, brown and white variegated.

HAB.—Frequently cultivated in European stations all over Pegu.—Fl. Begin. of R.S.; Fr. C.S.

REMARKS.—Wood white, light, soft and loose-grained, takes a fine polish; exudes plenty gum.

### CÆSALPINIA, L.

Calyx-lobes 5, imbricate in the bud, the lowermost often larger. Petals 5, nearly equal or the upper one smaller. Stamens 10, free; anthers uniform. Ovary sessile or nearly so, inserted at the base of the short calyx-tube often few-ovuled; style usually filiform with a terminal stigma. Pod various, more or less compressed, 2-valved or slowly dehiscent or indehiscent. Seeds transverse, usually separated by cellular partitions, without or (in *C. pulcherrima*) with

albumen.—Shrubs, often scandent, rarely trees, with or without prickles, the leaves abruptly bipinnate. Flowers often showy, in simple or paniced racemes.

\* *Stamens as long or a little longer than the petals. Seeds without albumen. Scandent prickly shrubs, rarely small trees.*

× Pods rigidly or thinly coriaceous, dehiscent or not.

○ Pod-valves smooth.

† Seeds flat-compressed; pods 2-valved, glabrous; leaflets large . . . . . *C. nuga.*

†† Seeds hardly compressed. Leaflets small.

Small tree; leaflets unequally oblong, retuse; pods hardly dehiscent . . . . . *C. sappan.*

Scandent shrub; leaflets ovate, acute; pods 2-valved . . . . . *C. sepiaia.*

○ Pod-valves echinate or glandular-hirsute.

† Pods echinate. Seeds almost globular.

The branchlets, etc., more or less brown or tawny pubescent; stipules large, pinnatifid . . . . . *C. Bonduca.*

†† Pods glandular-hirsute, at least when not fully ripe. Seeds oblong.

All parts more or less glandular-puberulous and prickly . . . . . *C. mimovoides.*

×× Pods fleshy-coriaceous, torose, with thickened sutures, indehiscent.

Panicle shortly tomentose and prickly . . . . . *C. tortuosa.*

Panicle smooth and unarmed . . . . . *C. digyna.*

\*\* *Stamens very long and slender. Seeds albuminous.*

Erect unarmed shrub, quite glabrous . . . . . *C. pulcherrima.*

1. *C. nuga*, Ait.—*Soo-kouk*.—A large scandent prickly shrub, all parts quite glabrous; leaves abruptly bipinnate,  $\frac{1}{2}$ –2 $\frac{1}{4}$  ft. long, with 2–5 pairs of pinnae, the rachises all prickly; leaflets in 2–3 pairs, ovate-oblong to elliptical, very shortly and bluntish acuminate or apiculate, 1–2 in. long, entire, coriaceous, smooth, glossy above, beneath pale-coloured and opaque; flowers middling-sized, yellow (the standard often red-tinged), on 3–4 lin. long pedicels, forming a rather slender glabrous raceme in the axils of the leaves or the racemes collected in a terminal panicle; calyx glabrous; pods almost falcate-ovate or elliptical, acute at both ends, glabrous, 2-valved, slowly dehiscent, coriaceous, the valves rather flat; seeds elliptical, much compressed.

HAB.—Rather frequent in the jungles all along the coast from Arracan down to Tenasserim and the Andamans.—Fl. May–Octob.

2. *C. sappan*, L.; Bedd. Sylv. Madr. 90, t. 13, f. 1.—*Teingnyet*.—A small bushy thorny tree (25–30 + 8 + 2), the young shoots puberulous; leaves abruptly bipinnate, 1 $\frac{1}{4}$ –2 $\frac{1}{2}$  ft. long, with 10 to 13 pairs of pinnae, the rachises thorny and glabrescent; leaflets 7–20 pairs, unequally elliptically oblong, retuse, about  $\frac{1}{2}$  in. long, minutely puberulous and dotted beneath; flowers showy, yellow (the standard with a red blotch), on slender pedicels up to an inch long, racemose, forming a terminal shortly rusty-pubescent panicle; calyx slightly pubescent; filaments woolly at the base; pods almost

falcate-oblong, acuminate, about 2 in. long, 2-valved, the valves rather flat, smooth; seeds compressed.

HAB.—Frequent in Tenasserim; Pegu, above Rangoon.—Fl. Aug.

REMARKS.—A red dye-wood called sappan-wood, an important article of commerce.

3. *C. sepiaria*, Roxb.; Brand. For. Fl. 156.—*Soo-kyin-bo*.—A large thorny scandent shrub, the branchlets rusty or tawny puberulous; leaves abruptly bipinnate, 1-1½ ft. long, with 6 to 10 pairs of pinnæ, the rachis prickly and minutely puberulous; leaflets in 8 to 10 pairs, oblong to linear-oblong, almost sessile, blunt, ½ to ¾ in. long, slightly appressed pubescent on both sides, in a dried state canescent beneath; flowers showy, yellow, on stiff about an inch long tawny or greyish velvety pedicels, forming a tawny or greyish velvety somewhat prickly raceme in the axils of the leaves and at the end of the branchlets; calyx petaloid, yellow, velvety; petals minutely puberulous outside; filaments white-woolly; pods oblong, sessile, terminating in a long lateral stylose acumen, rather compressed, with somewhat thickened borders, transversely nerved, about 2 in. long, the valves firmly coriaceous, brown, glabrous; seeds 4-8, obovate-oblong, brown and variegated, not compressed.

HAB.—Burma (no locality).

4. *C. Bonduca*, Roxb.; Brand. For. Fl. 156.—*Kalein*.—A large scandent prickly shrub, all parts more or less thinly brown or tawny tomentose; stipules large, pinnatifid; leaves abruptly bipinnate, 2-3 ft. long, with 3 to 10 pairs of pinnæ, the rachises all prickly armed and shortly tomentose; leaflets in 6-10 pairs, elliptical to elliptically oblong, almost sessile, blunt with a mucro, ¾-1 in. long, chartaceous, while young on both sides shortly puberulous, more or less glabrescent above; flowers middling-sized, yellow (the standard usually red-tinged towards the base), on ½-¾ in. long tomentose pedicels, forming a simple or branched rusty or brown-tomentose raceme in the axils of the leaves; calyx, base of petals, and filaments rusty tomentose; pods elliptical to elliptically oblong, blunt, about 2-3 in. long, 2-valved, the valves rather convex, puberulous and covered with subulate prickles; seeds globular, grey, smooth.

HAB.—Not unfrequent in the leaf-shedding forests from Prome and Martaban down to Tenasserim and the Andamans.

5. *C. mimosoides*, Lamk.—A large prickly scandent shrub, the branchlets densely glandular-puberulous and prickly; leaves abruptly bipinnate, 1 to 3 ft. long, with 12-24 pairs of pinnæ, the rachis puberulous and recurved prickly; leaflets in 8-16 pairs, sessile, unequally oblong to elliptically oblong, 3-5 lin. long, blunt, pubescent, membranous; flowers rather showy, yellow, on ½ an in. long or

somewhat longer prickly and glandular-pubescent slender pedicels, forming long, rather stiff, glandular-pubescent, prickly racemes in the axils of the leaves and terminal; calyx glandular-pubescent; filaments white-woolly; pods unequally and almost falcate-oblong, incurved-pointed, more or less turgid,  $1\frac{1}{2}$ -2 in. long, usually 2-seeded, the valves thin coriaceous, rigid, brown, especially while young hirsute; seeds oblong, not compressed, smooth, glossy dark-brown.

HAB.—Pegu, about Taungthoo, in shrubberies.—Fl. Fr. March-Apr.—l.—SS.=Lat. *Arg.*

6. *C. tortuosa*, Roxb.—A large prickly scandent shrub, the young shoots rusty puberulous; leaves abruptly bipinnate, 1- $1\frac{1}{2}$  ft. long, with 15 to 20 pairs of pinnae, the rachises minutely rusty tomentose and prickly; leaflets in 20-40 pairs, almost falcate-linear to oblong, unequally rounded at the base, blunt or almost retuse, about  $\frac{1}{2}$  an in. long, chartaceous, glabrous, while young slightly appressed-pubescent beneath; flowers showy, yellow, with red centre, on slender about  $\frac{1}{2}$  in. long pedicels, forming simple more or less prickly and minutely puberulous glabrescent racemes in the axils of the leaves; calyx and corolla glabrous; filaments rusty-villous; pods linear-oblong, torose, considerably twisted, coriaceous, smooth.

HAB.—Tenasserim.—Fl. Octob.

7. *C. digyna*, Rottl.—*Som-let-thai*.—A large scandent prickly shrub, the branchlets minutely puberulous or velvety; leaves abruptly bipinnate,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long, with 5-9 pairs of pinnae, the rachis minutely and slightly puberulous or glabrous, sparingly prickly; leaflets in 6-10 pairs, unequally oblong, oblique at the base, almost sessile, blunt, up to  $\frac{1}{2}$  an in. long, glabrous, membranous, pale-coloured beneath; flowers middling-sized, yellow (the petals often reddish at the base), on very slender about an inch long pedicels, forming rather long glabrous racemes in the axils of the leaves; calyx and corolla glabrous; filaments white (when dry tawny), woolly; ovary glabrous; pods 1-2 in. long, glabrous, torulose, oblong-lanceolate, 1-3-seeded, coriaceous and tardily dehiscing in two valves; seeds oblong, not compressed, black.

HAB.—Frequent all over Burma from Ava and Martaban down to Tenasserim, especially in shrubberies around villages and along choungs in open forests.—Fl. July-Octob.; Fr. Jan.-Apr.—l.—SS.=∞. *Dil.*

8. *C. pulcherrima*, Sw.; Brand. For. Fl. 157.—*Doung-sop*.—A large erect shrub, unarmed, all parts quite glabrous; leaves abruptly bipinnate,  $\frac{1}{2}$ -1 ft. long, with 5-7 pairs of pinnae, the rachises unarmed and more or less pruinous; leaflets in 6-12 pairs, oblong to elliptically oblong, somewhat unequal, very shortly

petioluled,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, retuse, chartaceous or membranous, glabrous, pale-coloured beneath; flowers large, showy, from yellow to orange-red or variegated in the same colours, on slender 2-3 in. long pedicels, forming terminal and axillary pruinous racemes; calyx smooth; petals glabrous, connate at base; filaments very slender, 1-1 $\frac{1}{2}$  in. long, quite glabrous; pods linear-oblong, acute at the base, 2-3 in. long, acuminate, the valves rather convex-flat, smooth, black; seeds 3-8, oblong, a little compressed, brown.

HAB.—Generally cultivated in villages all over Burma.—Fl. Fr. ∞.

### PELTOPHORUM, Vog.

Sepals 5, united at base in a cup, much imbricate, nearly equal, or the lowermost rather larger. Petals 5, spreading, the 2 lower outer ones rather larger. Stamens 10, free; anthers uniform. Ovary sessile, with 2 or more ovules; style filiform with a broad peltate stigma. Pod oblong-lanceolate, thin and flat, indehiscent, both margins wing-like expanded and marked with a longitudinal intra-marginal nerve. Seeds 1 or 2, rarely more, without albumen.—Unarmed trees, with bipinnate leaves, the leaflets small and numerous. Flowers racemose, in terminal panicles.

1. *P. ferrugineum*, Bth.—An evergreen tree (50—60 + 20—30 + 4—6), all softer parts rusty tomentose; leaves bipinnate, with 8-10 pairs of pinnæ,  $\frac{1}{2}$ –1 ft. long, while young rusty pubescent; leaflets in 10-20 pairs, opposite, oblong to almost falcate-oblong, blunt or almost retuse, often somewhat unequal, almost sessile,  $\frac{1}{2}$ – $\frac{3}{4}$  in. long, entire, firmly chartaceous, glabrous above, minutely puberulous beneath; flowers rather small, yellow, on 2-3 lin. long strong rusty-velvety pedicels, racemose and forming a rusty tomentose or velvety panicle at the end of the branchlets; calyx rusty-velvety, the sepals about 2 $\frac{1}{2}$ –3 lin. long; petals about 4-5 lin. long, obovate, waved, villous at the base; pods 2-3 in. long, oblong-lanceolate, almost sessile, shortly acuminate, thick coriaceous, minutely muricated, especially towards the coriaceous borders, or smooth, 1-4-seeded.

HAB.—Not unfrequent in the coast forests of the Andamans.—Fl. May—1.

REMARKS.—Wood blackish, the sap-wood whitish, coarse-fibrous, light.

### MEZONEURUM, Desf.

Sepals 5, at the base shortly united, much imbricate, the lowermost shorter and concave. Petals 5, spreading, rather unequal, the upper innermost one smallest, the 2 outer lower ones largest. Stamens 10, free; anthers uniform. Ovary with 2 or more ovules; style subulate, with a very small terminal stigma. Pod quite flat,

indehiscent or tardily opening in 2 valves, the upper suture bordered with a wing. Albumen none.—Woody, prickly-armed climbers, with abruptly bipinnate leaves, the leaflets opposite or alternate. Flowers showy, in racemes often collected in a panicle.

Leaflets  $\frac{1}{2}$  in. long, blunt or retuse, in 8-10 pairs . . . *M. glabrum*.  
 Leaflets in  $1\frac{1}{2}$  in. long, bluntnish acuminate, in 3-4 pairs . . . *M. cucullatum*.

1. *M. glabrum*, Desf.—A large scandent shrub armed with recurved prickles, all parts glabrous, or the shoots more or less puberulous or pubescent; leaves abruptly bipinnate, 1-1 $\frac{1}{2}$  ft. long, with 4-10 pairs of pinnae, the secondary rachises puberulous, the main rachis armed with recurved prickles; leaflets oblong to elliptically obovate, alternate or opposite or nearly so, in 8-10 pairs, very shortly petioluled, blunt or rather retuse, about  $\frac{1}{2}$  in. long, membranous, glabrous, glaucescent beneath; flowers rather large, yellow, on  $\frac{1}{2}$  in. long puberulous pedicels, forming a puberulous raceme in the axils of the leaves and collected in a panicle at the end of the branches; filaments somewhat pubescent; pods about 4 in. long, chestnut-brown or brown, glossy, chartaceous, smooth, the wing about  $\frac{1}{2}$  in. broad or somewhat narrower.

HAB.—Frequent in the lower and upper mixed forests, and especially around villages and along cloungs of Pegu; a more pubescent variety in the dry forests of Prome.—Fr. C.S.—L.—SS.—SiS., Ca.S., Dil., All.

2. *M. cucullatum*, W.A.; Brand. For. Fl. 155.—*Kyoung-chet*.—A large prickly scandent shrub, all parts quite glabrous; stems terete, about as thick as a man's arm or thicker, brownish grey, covered with small corky pustules and woody compressed oval warts terminated by a straight, short, but sharp prickle; leaves abruptly bipinnate, 1-1 $\frac{1}{2}$  ft. long, with 2-4 pairs of pinnae, the rachises armed with recurved prickles; leaflets ovate to elliptically ovate, in 3-4 pairs, on a line long petiolule, bluntnish acuminate, 1 $\frac{1}{2}$ -2 in. long, entire or waved, thin coriaceous, glabrous and glossy; flowers middling-sized, yellow, on 3-6 lin. long pedicels, forming simple or branched glabrous racemes often arranged in a terminal panicle; filaments glabrous, bluish; pods 2-4 in. long, very flat, brown and rather glossy, the wing about  $\frac{1}{2}$  in. broad.

HAB.—Frequent all over Burma from Ava to Pegu and Martaban, in the mixed and dry forests.—Fl. Febr.-March; Fr. Nov.—L.—SS.— $\infty$ .

## ACROCARPUS, Wight.

Calyx-tube almost bell-shaped, 5-lobed, the lobes short, lanceolate, slightly imbricate in bud. Petals 5, narrow, equal or nearly so, in bud imbricate and unequal with the standard larger and inside. Stamens 5, free; filaments thick and elongate; anthers versatile. Ovary stalked, free on the bottom of the calyx, many-

ovuled; style short, inflexed, the stigma terminal, small. Pod very flat, linear, stalked, narrowly winged along the ventral suture, 2-valved, slightly torulose, many-seeded.—Unarmed trees, with bipinnate leaves. Flowers rather large, in robust racemes at the end of the branches.

1. *A. fraxinifolius*, Wight; Bedd. Sylv. Madr. t. 44.—*Mayanheng*.—A tree (80—100+60—70+6—8), shedding leaves in C.S., the very young shoots appressed pubescent; bark about 2 lin. thick, greyish, annular, sprinkled with rusty coloured tubercles; cut dry, whitish; leaves unpaired-bipinnate,  $1\frac{1}{2}$ –3 ft. long, pinnæ in 2–4 pairs, with an odd one, opposite, the rachises while very young pubescent, quite glabrescent; leaflets in 8–6 pairs, with or without an odd one, ovate to ovate-oblong, very shortly (1 lin.) petioluled, opposite, acuminate,  $1\frac{1}{2}$ –2½ in. long, chartaceous, while young shortly pubescent beneath, soon quite glabrous; flowers middling-sized, green, on puberulous about 2 lin. long pedicels, arranged in robust more or less tawny or rusty velvety racemes arising solitary or by 2–3 at the end of the leafless branchlets; calyx shortly pubescent, green, the lobes about 2 lin. long, blunt; petals linear-cuneate, about 3–4 lin. long, green; filaments glabrous, thick, from a green base yellow and orange; pods elongate linear-oblong, very flat and slightly torulose, black and varnished, tapering in a slender  $\frac{1}{4}$  an in. long or longer stalk, acute, 4–4½ in. long, 17–18-seeded, the wing nearly  $1\frac{1}{2}$  lin. broad; seeds small, somewhat compressed, pale-brown.

HAB.—Common in the tropical forests of the Pegu Yomah.—Fl. Jan.–Feb.; Fr. Apr.–May.—s: 1.

REMARKS.—Wood white, soft.

### PTEROLOBIUM, R. Br.

Sepals 5, at the base united in a cup, imbricate, the lowest longer and concave. Petals 5, spreading, the 2 lower ones rather larger. Stamens 10, free; anthers uniform. Ovary sessile, with a solitary ovule; style filiform with a truncate stigma. Pod samaroid, indehiscent, ending in a large wing. Seed basal, without albumen.—Scandent prickly shrubs, with abruptly pinnate leaves. Flowers in simple or paniced racemes.

1. *P. macropterum*, Kz.—*Kyoung-gyet-mway*.—A large scandent shrub, armed with short prickles, the young shoots slightly puberulous; leaves abruptly bipinnate,  $\frac{1}{2}$ –¾ ft. long, with 7–8 or more pairs of pinnæ, the rachises prickly and shortly puberulous; leaflets in 7–9 or more pairs, almost sessile, unequal, oblong or elliptically oblong,  $\frac{1}{4}$ –½ in. long, rounded or retuse, membranous, glabrous, pale-coloured beneath; flowers white, small, shortly pedicelled, forming an axillary (? glabrous) raceme; pods samaroid, the seed-

bearing base more than  $\frac{1}{2}$  an inch long, the wing  $1\frac{1}{2}$  in. long by nearly an inch broad, semi-oblong, rounded at the apex, the inner suture straight.

HAB.—Frequent in the mixed forests, especially along choungs, from Pegu and Martaban down to Tenasserim.—Fr. Jan.—1.

### AMHERSTIA, Wall.

The disk-bearing calyx-tube elongate; segments 4, petaloid, somewhat unequal, imbricate. Petals 5, the upper innermost one very broadly obcordate, the 2 lowermost ones minute or rudimentary. Stamens 10, alternately shorter, 9 of them connate at base. Ovary stalked, many-ovuled; style filiform with a terminal stigma. Pod elongate, flat compressed, 2-valved, the upper suture thickened-dilated. Seeds very compressed, without albumen.—Unarmed trees, with abruptly pinnate leaves and narrow, leafy, deciduous stipules. Flowers showy, in drooping terminal racemes. Bracts very deciduous; bractlets ample, highly coloured, persistent.

1. *A. nobilis*, Wall.—*Thaw-ka* or *so-ka*.—An evergreen tree, 30—40 ft. high, the young shoots shortly puberulous; leaves  $1-1\frac{1}{2}$  ft. long, abruptly pinnate, while very young minutely puberulous beneath, soon quite glabrous; leaflets in 6-8 pairs, on a thick 1-3 lin. long petiolule, oblong to ovate-oblong, rounded at the base, long and slenderly acuminate, 3-5 in. long, entire, chartaceous, glabrous, somewhat glaucous beneath; flowers large and showy, crimson, with the 3 lower petals yellow towards the apex, on 3-4 in. long minutely puberous pedicels furnished with a pair of  $1\frac{1}{2}$  in. long broadly lanceolate, acuminate, crimson, minutely puberulous bractlets, forming long almost glabrous drooping racemes at the end of the branchlets; sepals glabrous, linear-oblong, rather blunt; petals glabrous, waved, about 3 in. long; ovary tawny-pubescent; pods oblong, flat, glabrous, on a long stalk, about 7 in. long.

HAB.—Tenasserim.—Fl. Jan.-Apr.—s.

### AFZELIA, Sm.

Calyx-tube narrowly funnel-shaped or cylindrical, the limb 4-parted, segments almost equal or the inner pair slightly longer, imbricate. Standard longer than the calyx, clawed, the lateral and anterior petals minute, scale-like or none. Perfect stamens 7, the others reduced to staminodes or suppressed; filaments elongate, at the base very shortly united; anthers versatile. Ovary shortly stalked, with 8 to 10 or more ovules. Pod more or less oblong, 2-valved. Seeds separated by transverse spongy septa, with a cup-shaped arillus at base.—Unarmed trees, with abruptly pinnate leaves.

Flowers in terminal racemes often collected into panicles. Bractlets deciduous.

Inflorescence and calyx puberulous; pods  $\frac{1}{2}$ -1 ft. long, woody;

leaves usually bluntnish

Inflorescence and calyx smooth; pods 3-4 in. long, thin coriaceous; . *A. bijuga*.

leaves notched

. . . . . *A. retusa*.

1. *A. bijuga*, A. Gray.—An evergreen tree (40—60+15—20+3—5), the very young shoots minutely puberulous; leaves abruptly pinnate,  $\frac{1}{2}$  to  $\frac{1}{2}$  ft. long, the rachis while young minutely puberulous; leaflets in 2 or 3 rarely 1 pair only, opposite or somewhat alternate, on 1-2 lin. long puberulous petiolules, oval to ovate-oblong, bluntnish to bluntnish acuminate, rarely retuse,  $1\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, entire, chartaceous, glabrous; flowers rather small, white, on puberulous  $\frac{1}{2}$ - $\frac{1}{2}$  in. long bractless pedicels, forming puberulous racemes usually by 2 or 3 or more collected in a terminal panicle; calyx velvety, the tube 2-3 lin. long, the lobes obovate-oblong, about 4 lin. long; petals glabrous, the lowermost one  $\frac{1}{2}$  an in. long, orbicular, undulate, clawed; pods woody, up to  $\frac{1}{2}$ -1 ft. long by 2 in. broad, oblong, curved, glabrous, apiculate, sessile; seeds ovoid-oblong, compressed, about an inch long.

HAB.—Not unfrequent in the coast and beach jungles of the Andaman Islands.—Fl. May-June; Fr. Apr.—1.

REMARKS.—Used in the Andamans for beams and girders of bridges and for posts. Wears well.

2. *A. retusa*, Kz.—An evergreen tree, 15-20 ft. high, all parts quite glabrous; leaves abruptly pinnate, the rachis very short, glabrous; leaflets in a single or 2 pairs, more or less oval, somewhat oblique, very shortly petioluled,  $1\frac{1}{2}$  to 2 in. long, entire, chartaceous, notched, glabrous; flowers rather small, white, on about 4 lin. long glabrous pedicels, forming short glabrous simple racemes at the end of the branchlets; bractlets under the calyx 2, small, concave-cymbiform, persistent; calyx smooth, the tube about 4 lin. long, the lobes obovate, as long as the tube; pods oblong, 3-4 in. long by 1-1 $\frac{1}{2}$  broad, thin coriaceous, glabrous, somewhat curved along the thickened sutures.

HAB.—Not unfrequent along the coast of the Andamans, in tidal and beach forests.—Fl. May.—1.—SS.—Sal. (?)

### SINDORA, Miq.

Calyx-tube disk-bearing, very short or none, the limb 4-parted, the lobes valvate or nearly so. Petal 1 only, sessile. Stamens declinate, shortly and obliquely monadelphous, the uppermost one without anther, the 2 following perfect, the 7 others short and castrate; anthers longitudinally dehiscent. Ovary shortly stalked,

free, few-ovuled; style filiform, with a minute terminal stigma. Pod 2-valved, broad, rigidly coriaceous, usually echinate, often 1-2-seeded. Seeds large, with a large basilar arillus-like strophiole.—Trees, with paired-pinnate leaves. Flowers racemose, one-sided, in terminal panicles. Stipules large, like the bracts and bractlets caducous.

1. *S. Siamensis*, Miq.—An evergreen tree, the young parts tawny puberulous; stipules rather large, falcate-lunate, deciduous; leaves abruptly pinnate, shortly petioled, the rachis terete, glabrescent; leaflets usually in 3 pairs, obovate, very shortly petioluled, obtuse or acute at the base, more or less notched, coriaceous,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, densely and elegantly net-veined, puberulous, the margins somewhat thickened and reflexed; flowers shortly pedicelled, bracted, racemose, forming terminal tawny puberulous panicles; sepals  $2\frac{1}{2}$  lin. long, densely tawny velvety, mucronate at the apex; pods broadly oval, 3-4 in. long, flat, thick coriaceous, distantly but strongly echinate, glabrous; seeds compressed orbicular, about  $\frac{3}{4}$  in. across, the arillus-like strophiole half the size of the seed, in a dried state horny.

HAB.—Adjoining provinces of Siam.—Fl. Fr. H.S.

### PAHUDIA, Miq.

Calyx-tube disk-bearing, more or less elongate, the limb 4-parted, the lobes decussately imbricate. Petal one only developed, shortly clawed, the lower ones very rudimentary or altogether wanting. Stamens 7, declinate, united high up into a slit sheath, the filaments unequal and free at the summit, often with 2 small staminodes situated at the base of the staminal tube; anthers longitudoinally dehiscing. Ovary stalked, few-ovuled; style filiform, with a small, terminal stigma. Pod as in *Sindora*, 2-valved, but very thick and woody, smooth. Seeds with a large basal arillus-like strophiole.—Trees, with paired-pinnate leaves. Flowers racemose, in sessile or peduncled terminal panicles. Stipules, bracts, and bractlets very caducous.

1. *P. xylocarpa*, Kz.—A tree, the branchlets pruinose, and while young somewhat puberulous; leaves paired-pinnate, shortly petioled, the rachis very slender, glabrous; leaflets in 2 (in the floral ones only in single) pairs, on a thick about  $1\frac{1}{2}$ -2 lin. long petiolule, more or less oval, rounded at the base, more or less notched, thin chartaceous, 3- $3\frac{1}{2}$  in. long, glabrous, glaucous beneath, the net-venation thin and lax; flowers almost one-sided, racemose, on short thick pedicels, forming grey-puberulous terminal panicles; sepals grey-velvety, about  $2\frac{1}{2}$  lin. long, concave-obovate; pods on a woody very thick peduncle, rhomboid-oblong, 2-valved; very thick-woody and somewhat turgid, 4-5 in. long, glabrous.

seeded; seeds compressed, orbicular, enclosed in the medullary endocarp,  $1\frac{1}{2}$  in. across, supported by the horny, large, arillus-like funicle.

HAB.—Adjoining provinces of Siam.—Fr. H.S.; Fr. begin. of R.S.

## TAMARINDUS, L.

Sepals 4, united at the base into a turbinate tube, the segments much imbricate. Petals 3, the lateral ones ovate, the upper inner one narrower, concave. Stamens incurved, united up to the middle in a sheath, 3 or rarely 2 only perfect, the 4 or 5 others reduced to short teeth at the summit of the sheath. Ovary stalked, with several ovules; style inflexed, rather thick, with a truncate stigma. Pod thick, the epicarp crustaceous and fragile, the mesocarp pulpy, the endocarp thick and fleshy, forming complete partitions between the seeds. Albumen none.—Trees, with abruptly pinnate leaves. Flowers in terminal racemes.

1. *T. Indica*, L.; Bedd. Sylv. Madr. t. 184; Brand. For. Fl. 163.—*Magyee* or *majee-pen*.—An evergreen tree, rarely leaf-shedding (50—60 + 8—20 + 6—12), the young shoots puberulous; leaves abruptly pinnate, 2-3 in. long, glabrous; leaflets in 8-12 pairs, opposite, oblong-linear, somewhat oblique, sessile or nearly so,  $\frac{1}{2}$ -1 in. long, rounded or reflex at the apex, entire, chartaceous, glabrous, somewhat glaucescent beneath; flowers rather small, with rose-coloured petals, on 3-4 lin. long pedicels, forming short terminal bractless racemes; sepals 3-4 lin. long, glabrous; petals lanceolate, somewhat longer than the sepals, acuminate, somewhat orange, streaked with scarlet, undulate; pods 3-6 in. long, thick, somewhat torose, elongate-oblong, the epicarp fragile, rough, brownish grey, the pulp very acid and edible, red while unripe, then brownish olive.

HAB.—Generally cultivated all over Burma, but apparently nowhere wild.—Fl. H.S.; Fr. C. S.—SS.=∞ CaS.

REMARKS.—Sap-wood yellowish white, not heavy, rather fibrous and loose-grained, perishable; the heart-wood of old trees only small, very hard, dark-coloured and resembling ebony, sometimes beautifully dark-reddish veined. Good for oil-mills, mallets, rice-pounders, also for furniture and in house-building, but difficult to work on account of its hardness. Yields a white resin in small quantities.

## SARACA, L.

The disk-bearing calyx-tube elongate; segments 4, petaloid and nearly equal, much imbricate. Petals none. Stamens 3-9, free, the filaments elongate; anthers almost uniform. Ovary stalked, many-ovuled; style filiform with a terminal blunt stigma. Pod

oblong or elongate, flat or somewhat turgid, 2-valved. Arillus and albumen none.—Unarmed trees, with abruptly pinnate leaves. Stipules small, deciduous. Flowers racemose, forming short lateral and terminal panicles.

1. *S. Indica*, L.; Bedd. Sylv. Madr. t. 57 (except the pod); Brand. For. Fl. 166.—*Thau-ka-hpo*.—An evergreen tree (25—30 + 8—12 + 2—3), all parts glabrous; leaves abruptly pinnate,  $\frac{3}{4}$ —1 $\frac{1}{2}$  ft. long, glabrous; leaflets in 4-5 pairs, on a thick 1-2 lin. long petiolule, oblong to oblong-lanceolate, shortly acuminate to bluntish, 4-6 in. long, thin coriaceous, entire; flowers middling-sized, scarlet, on  $\frac{1}{2}$ —1 in. long scarlet smooth pedicels 2-bracteoid at middle, forming a glabrous usually nodding more or less crowded cymose panicle at the end of the branchlets and lateral; bracts smaller than the bractlets, triangular-acute; calyx glabrous, scarlet, the tube about  $\frac{1}{2}$  an in. long, the lobes elliptical, about 3 lin. long, rounded; pods flat, elongate oblong-lanceolate, woody coriaceous,  $\frac{1}{2}$ — $\frac{3}{4}$  ft. long, long-stalked, smooth.

HAB.—Tropical forests of Arracan, as, *c. g.*, Boronga island; also Tenasserim.—Fl. Oct.—s.—SS.—SiS.

### CYNOMETRA, L.

Sepals at the base very shortly united, the free part separating into 4 imbricate segments, the upper one rather broader. Petals 5, nearly equal. Stamens 10 or more, free; filaments filiform; anthers uniform. Ovary nearly sessile, with 2 ovules; style subulate, with a small terminal stigma. Pod obliquely half-orbicular, fleshy and often edible, turgid, 2-valved. Seed usually solitary.—Unarmed trees or shrubs, with abruptly pinnate leaves, the leaflets in few pairs only. Flowers small, in axillary or lateral clusters or racemes.

Flowers in short umbel-like puberulous racemes; ovary villous . . . *C. ramiflora*.

Flowers in longer or shorter bracted racemes; pedicels glabrous; ovary glabrous or puberulous . . . . . *C. cauliflora*.

1. *C. ramiflora*, L.; Bedd. Sylv. Madr. t. 315.—*Myeng-ka-pen*.—An evergreen tree (15—25 + 4—10 + 1—2), all parts glabrous or the young shoots puberulous; leaves abruptly pinnate, 2-6 in. long, the rachis strong and glabrous or slender and puberulous; leaflets in 1 or 2 pairs, obliquely obovate-oblong to almost falcate-oblong, sessile or nearly so, 1-3 in. long, entire, very blunt or shortly and bluntish acuminate, coriaceous, glabrous; flowers small, white, on slender 3-4 lin. long puberulous pedicels, forming small umbel-like clusters above the axils of the fallen leaves; bracts very deciduous; calyx about a line long; stamens 10; ovary tawny villous; pods fleshy and strongly wrinkled, irregularly oblong or ovoid, terminating in a fleshy thick acumen, about  $\frac{1}{2}$  in. long and nearly as broad, glabrous.

HAB.—Frequent in the tidal and beach jungles along the coasts from Chittagong down to Tenasserim and the Andamans.—Fl. Oct.; Fr. C.S.—l.—SS=Sal.

2. *C. cauliflora*, L.; Bedd. Sylv. Madr. t. 315.—An evergreen tree (15—20 + 1—2 + 2—3), all parts glabrous; leaves abruptly pinnate, glabrous; leaflets in a single pair or rarely one of them abortive, very shortly petioluled or almost sessile, unequal, dimidiate-oblong to somewhat falcate-lanceolate, somewhat narrowed at the notched apex, 2-3 in. long, entire, thin coriaceous, glabrous; flowers small, white, or a little red-tinged, on rather thick glabrous pedicels about 2 lin. long, forming shorter or longer sessile, bracted, glabrous racemes arising by 3 or more from the trunk and older branches; bracts concave-ovate, more than  $\frac{1}{2}$  a line long, glabrous; filaments and ovary glabrous or the latter a little puberulous; pods thick and fleshy, conspicuously wrinkled and turgid, irregularly oblong to almost irregularly globose, apiculate, glabrous, 1-4 in. long, edible.

HAB.—Burma, cultivated only.

II.—SUB-ORD. *Mimoseæ*. *Flowers regular. Sepals and petals valvate and often united. Stamens 5 or 10, or very numerous.*

### ENTADA, Adans.

Calyx very shortly 5-toothed. Petals 5, valvate, more or less united or free. Stamens 10, free, shortly exserted; anthers gland-tipped. Ovary nearly sessile, with several ovules; style filiform, with a truncate stigma. Pod large and long, flat, coriaceous or woody, the sutures thick and persistent after the separation of the one-seeded articles, the endocarp separating from the epicarp and persistent round the large flat seeds.—Lofty woody climbers, unarmed, with abruptly bipinnate leaves. Flowers small, sessile, in long spikes sometimes collected into a terminal panicle. Bracts very small.

1. *E. scandens*, Bth.; Brand. For. Fl. 167.—*Kong-nyin-nway*.—A very large scandent shrub, all parts glabrous, the stems screw-like twisted and often as thick as a man's thigh, with patelliform protuberances; bark 2 lin. thick, blackish or brownish, squarish fissuring and corky lenticellate; cut red; leaves abruptly bipinnate, glabrous, with 2 or rarely 1 pinnae only, the terminal one transformed in a double tendril; leaflets in 2-5 pairs, oblong to obovate-lanceolate, very shortly petioluled, narrowed at both ends, retuse, 1-2½ in. long, entire, membranous or thin chartaceous; flowers small, yellowish, sessile, forming elongate slightly pubescent spikes in the axils of the upper leaves or arranged in a terminal panicle; calyx  $\frac{1}{2}$  lin. long; petals about a line long; pods 2-4 ft. long by 2-3 in. broad, woody,

with woody thickened borders, jointed, torulose; seeds nearly  $1\frac{1}{2}$  in. in diameter.

HAB.—Frequent all over Burma and adjacent provinces and islands, especially in the mixed forests.—Fl. March-Apr.; Fr. C.S.—s: 1.—SS. =  $\infty$  SiS., All.

REMARKS.—Wood very coarse, fibrous, and porous.

## ADENANTHERA, L.

Calyx 5-toothed. Petals 5, valvate, at length free. Stamens 10, free; anthers tipped with a deciduous gland. Ovary sessile, with several ovules; style filiform, with a small terminal stigma. Pod compressed, elongate, often curled up when fully ripe, 2-valved, the endocarp often forming more or less complete partitions between the seeds. Testa of seeds hard, shining scarlet. Albumen scanty.—Unarmed trees, with abruptly bipinnate leaves. Flowers small, pedicelled, in long spike-like racemes often collected in a terminal panicle.

1. *A. pavonina*, L.; Bedd. Sylv. Madr. t. 96.; Brand. For. Fl. 168.—*Yuay-kyee*.—A tree (60—70+30—40+4—6), shedding leaves in C.S., the young shoots appressed silk-hairy; leaves abruptly bipinnate,  $1-1\frac{1}{2}$  ft. long, with 5-2 pinnæ, while young appressed pubescent; leaflets in 6-10 pairs, on a very short puberulous petiolule, elliptically oblong, blunt,  $\frac{1}{2}-1$  in. long, entire, beneath puberulous and glaucous; flowers small, yellow, on a line long capillary puberulous pedicels, in pubescent elongate racemes forming a terminal simple panicle or rarely solitary in the axils of the leaves; calyx  $\frac{1}{2}$  lin. long, puberulous; petals about a line long; pods curved, 4-6 in. long, linear, acuminate at both ends, when fully ripe curling up, torose, 2-valved, thin coriaceous, black and glabrous outside, pale-yellow within; seeds about 4 lin. in diameter, shining scarlet, lenticular-compressed.

HAB.—Frequent all over Burma and adjacent islands, in the tropical forests up to 2,500 ft. elevation.—Fl. Apr-May; Fr. C.S.—s.—SS.=SiS. *Metam.*

REMARKS.—Wood rather heavy, coarse, fibrous, light-brown or yellowish grey, turning brown at exposure, hard and close-grained, soon attacked by xylophages; the heart-wood dark-brown, solid, hard and durable. Suitable for cabinet-work. Wood yields a red dye. The scarlet seeds are used by jewellers for weights, also for ornaments, &c.

## PARKIA, R. Br.

Flowers 5-parted, in heads, the upper ones hermaphrodite, the lower ones male or sterile. Calyx tubular with a shortly 5-lobed bilabiate limb, the two lower segments larger. Petals narrowly linear-spatulate, confluent below with the filaments, valvate

in bud (?). Stamens 10, exserted; anthers blunt. Ovary stalked or sessile, many-ovuled; style slender, with a minute terminal stigma. Pods elongate or oblong, compressed, 2-valved, almost indehiscent or dehiscent, coriaceous. Seeds enveloped in fleshy or dry pulp. Albumen none.—Unarmed trees, with abruptly bipinnate leaves, the leaflets usually very numerous. Flowers small, each furnished with a narrow spatulate bract, sessile, in dense globose or pyriform long-peduncled pendulous heads.

Receptacle irregular; calyx-lobes rotundate; pinnæ 20 or more;

leaflets only  $\frac{1}{2}$  in. long, quite glabrous . . . . . *P. leiophylla*.

Receptacle globose; calyx-lobes obovate-eminate; pinnæ about 8;

leaflets an inch long, pubescent beneath . . . . . *P. insignis*.

1. *P. leiophylla*, Kz.—A tree (80—120+50—80+6—9), leafless in H.S., the young shoots pubescent; leaves abruptly bipinnate, 1-2 ft. long, with about 20 or more almost opposite pinnæ, the rachises all tawny and shortly pubescent; leaflets about 30-40, sessile, opposite, linear-oblong and a little falcate, obliquely auricled at the base,  $\frac{1}{2}$  in. long by about 2 lin. broad, obliquely acute, thin coriaceous, quite glabrous, 1-nerved with a solitary lateral basal nerve, penninerved; flowers small, yellowish, densely crowded on an irregularly globose receptacle contracted into a nearly an inch long stalk and forming a dense club-shaped head on 1-1 $\frac{1}{2}$  ft. long glabrous peduncles forming shorter or longer racemes at the end of the branches; calyx nearly 4 lin. long, the tube glabrous, the lobes rotundate and densely tawny tomentose outside; pods 1-1 $\frac{1}{2}$  ft. long, linear, narrowed into a  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long stalk, rounded at the apex, glabrous and somewhat varnished, black, torose at the numerous seeds.

HAB.—Frequent in the tropical and moister upper mixed forests along the eastern slopes of the Pegu Yomah.—FL. H.S. (?) ; Fr. Feb.-March.—s. : l.—SS. =SiS.

REMARKS.—Sap-wood white, soft.

2. *P. insignis*, Kz.—*Myouk-tanyet*.—A tree (80—100+40—60+6—8), leafless in H.S., the young shoots tawny pubescent; bark dark-brown,  $\frac{1}{2}$  in. thick, roughish; cut red; leaves abruptly bipinnate, 1-2 feet long, with about eight almost opposite pinnæ, the rachises tawny or rusty tomentose; leaflets in 20 to 25 pairs, almost opposite, a little falcate, oblong, sessile, with an unequal slightly auricled base, rounded at apex, 1 in. long by  $\frac{1}{2}$  broad, entire, coriaceous, the nerves excepted glabrous above, beneath pubescent, penninerved, with the nerves arcuately anastomizing; flowers small, yellow, sessile, and densely crowded on the club-shaped globose receptacle narrowed into an inch long stalk, forming a club-shaped head on the 1 ft. long peduncles which arise several together at the end of the branches; calyx about 4 lin. long, the tube

glabrous or nearly so, the lobes obovate-cuneate, appressed tawny pubescent.

HAB.—Not unfrequent in the tropical forests of Martaban, east of Tounghoo.—Fl. March-Apr.—s: l.—SS.—Metam.

REMARKS.—Wood yellowish, turning pale-brown, rather heavy, of a somewhat unequal coarse fibre, soon attacked by xylophages. Exudes a red resin.

### XYLIA, Bth.

Flowers small, 5-parted, sessile, mostly hermaphrodite. Calyx tubular-bell-shaped, 5-toothed. Petals slightly cohering at the base, valvate. Stamens 10, free, exserted; anthers without glands. Ovary sessile, many-ovuled; style filiform, with a small terminal stigma. Pod sessile, broadly falcate, flat, woody, elastically 2-valved, septate between the transverse compressed seeds.—Unarmed trees, with abruptly bipinnate leaves, the pinnæ in a single pair. Stipules small, linear, deciduous. Flower-heads globular, peduncled, solitary from the scars of the fallen leaves or spuriously racemose.

1. *X. dolabriformis*, Bth.; Bedd. Sylv. Madr. t. 186; Brand. For. Fl. 171.—*Pynkadoe*.—A tree (90—100 + 50—60 + 9—12), remaining stunted in sterile grounds, leafless in H.S., the young shoots yellowish pubescent; bark very thin, greyish, rather smooth, longitudinally striate, peeling off in irregular rounded pieces; leaves abruptly bipinnate, the single pair of pinnæ on a 1-1½ in. long petiole, while very young pubescent, soon glabrescent; leaflets in 4-5 pairs, on a thick a line long petiolule, ovate to ovate-oblong, somewhat oblique, 1½-3 in. long, bluntish acuminate, chartaceous, when full grown glabrous; flowers small, yellowish, sessile, in a small pubescent head borne on 1½-2 in. long shortly pubescent peduncles arising from above the scars of the fallen leaves and often appearing spuriously racemose or clustered; calyx yellowish villous; pods broadly falcate-lanceolate, cuneately tapering at the base, 3-4 in. long, greyish brown, glabrous, striate, rather acute, flat, woody elastically 2-valved, many-seeded.

HAB.—Common in all leaf-shedding forests, but chiefly in the upper mixed forests, all over Burma from Ava and Martaban down to Tenasserim, up to 3,000 ft. elevation.—Fl. March-Apr.; Fr. C.S.—l.—SS.— $\infty$  S/S.

REMARKS.—Wood brown to dark-brown, heavy, fibrous, but close-grained, very hard, strong and durable, but not easy to work.  $\square' = 60-66$  pd. "The iron-wood of Pegu." The sap-wood soon attacked by white ants, but the heart-wood said to be as durable as teak. Recommended for spars, crooks of ships, railway sleepers, handles of chisels, gauges. Used for ploughs, house-bridge-posts, boat anchors, in the construction of carts and for other Exudes a red resin.

## ACACIA, Willd.

Sepals 5, 4, or 3, free or united, rarely wanting altogether. Petals as many, free or united. Stamens indefinite, usually very numerous, free or slightly united at the very base. Ovary sessile or stalked, with 2 to many ovules; style filiform with a small terminal stigma. Pod linear or oblong, flat to nearly cylindrical, straight falcate or variously twisted, opening in 2 valves or indehiscent. Seeds more or less flattened, the funicle usually thickened under or round the seed.—Trees or shrubs, often scandent, prickly or unarmed, with abruptly bipinnate leaves reduced to simple phyllodia (dilated petioles). Flowers small, in globular heads or cylindrical spikes, often polygamous.

\* Trees or erect shrubs, armed only with paired diverging stipulary or infra-stipulary spines.

× Flowers in globular heads.

Pods thick and almost terete, fleshy; flower-heads clustered. . . *A. Farnesiana*.

Pods flat, dry; flower-heads arranged in terminal panicles . . . *A. leucophlœa*.

× × Flowers in spikes.

○ Leaves with 10-30 pairs of pinnæ; leaflets 1-nerved at base. Pods slenderly stalked.

Spikes white, tomentoso; young leaves greyish pubescent; bark white . . . *A. suma*.

Spikes yellow, glabrous or pubescent; leaves glabrous or nearly so; bark dark-brown . . . *A. catechu*.

○ ○ Leaves with 3-5 pairs of pinnæ; leaflets 3-5-nerved at base, glabrous . . . *A. ferruginea*.

\* \* Climbers. No stipulary prickles, but the branchlets armed along their whole length with recurved sharp prickles. Flower-heads globular.

× Pods thick, fleshy-coriaceous, glabrous . . . *A. concinna*.

× × Pods dry, chartaceous or thin coriaceous, flat.

○ Ovary and pods pubescent . . . *A. cavia*.

○ ○ Ovary and pods glabrous.

Leaflets 8-20 pairs,  $\frac{1}{2}$  in. long . . . *A. Intsia*.

Leaflets in 30-40 pairs, 2-3 lin. long; branchlets puberulous, but not pruinose; flower-heads the size of a large pea . . . *A. pennata*.

As preceding, but the flower-heads doubly larger; branchlets pruinose; leaflets about 6 lin long, glabrous . . . *A. pruinescens*.

\* Trees or erect shrubs, armed only with paired diverging stipulary or infra-stipulary spines.

1. *A. Farnesiana*, Willd.; Bedd. Sylv. Madr. t. 51; Brand. For. Fl. 180.—*Nan-lon-kyang*.—An evergreen tree (20—25+8—10+1— $1\frac{1}{2}$ ), armed with paired, straight, sharp, stipulary spines of 2-3 lin. length, the young shoots slightly pubescent; leaves abruptly bipinnate,  $1\frac{1}{2}$ -3 in. long, with 3-6 pairs of pinnæ, the rachises slightly and minutely pubescent, usually with a minute gland above the base of the petiole; leaflets in 12-20 pairs, linear-oblong and very slightly curved, blunt or almost acute, sessile, 2-3 lin. long, coriaceous, glabrous or nearly so; flowers small, very

scented, sessile, in globular heads of nearly  $\frac{1}{2}$  an in. in diameter, borne on 1-1 $\frac{1}{2}$  in. long pubescent or almost glabrous naked peduncles arising by 1-4 or more from the axils of the leaves; calyx shortly toothed, almost glabrous; petals twice as long as the calyx, tubular-connate; pods coriaceous, irregularly cylindrical, straight or curved, almost sessile, acuminate, 1-2 in. long, smooth, or in a dried state striolate, indehiscient or nearly so; seeds irregularly oblong, oblique.

HAB.—Frequently cultivated in villages all over Burma, more especially in Prome and Ava, and here often semi-spontaneous.—Fl. Jan.—l.—SS.=∞CaS.

REMARKS.—Wood very hard and tough, much used in India for ship-knees, tent-pegs, and similar purposes. A delicious perfume is distilled from the flowers. Exudes a considerable quantity of a sort of white gum-arabic.

2. *A. leucophlœa*, Willd.; Bedd. Sylv. Madr. t. 48; Brand. For. Fl. 184, t. 27.—*Ta-noung*.—A leaf-shedding tree (50—60+8—25+4—6), the lower branches fearfully armed with paired, straight, sharp, blackish, stipulary spines of  $\frac{1}{2}$ -1 in. length, the young shoots pubescent or almost glabrous; leaves abruptly bipinnate, 3-4 in. long, with 4-7 pairs of pinnae, the rachises pubescent or almost glabrous; leaflets in 12-30 pairs, obliquely linear-oblong, blunt or acute, 3-4 lin. long, rigidly chartaceous, glabrous or slightly pubescent; flowers minute, sessile, yellowish, in globular heads of the size of a pea or pepper-kernel, on 2-3 lin. long pubescent or tomentose slender or robust peduncles bracted at middle, arranged in an ample leafless tomentose or puberulous panicle at the end of the branchlets; calyx about  $\frac{1}{4}$  lin. long, like the corolla slightly pubescent outside; pods narrow-linear to linear, usually curved, while young shortly tomentose, sometimes quite glabrescent, blunt with a mucro, 3-4 in. long, flat, 2-valved; seeds compressed, greyish brown.

HAB.—Not unfrequent in the dry forests of Prome; also Ava.—Fr. March.—l.—SS.=CaS.

3. *A. Suma*, Buch.; Brand. For. Fl. 187 (*A. catechu*, Bedd. Sylv. Madr. t. 49).—An evergreen (?) tree (30—40+12—20+3—4), the shoots and young parts all greyish pubescent, the stem remarkably white and armed with occasional woody tubercles terminated by a prickle, the branches prickly from paired usually straight, sharp, stipulary spines; leaves abruptly bipinnate, 4-10 in. long, with 10-30 pairs of pinnae, the rachises shortly greyish pubescent; leaflets in 30 to 50 pairs, sessile, linear, acute, not or slightly falcate, 2-3 lin. long, ciliate, and often also hairy along the midrib beneath, chartaceous; flowers small, white, sessile, forming greyish pubescent spikes in the axils of the leaves; calyx about a line long, greyish velvety; corolla only a little longer than the calyx

puberulous; pods linear-oblong, rigidly coriaceous, greyish brown, tapering in a short stalk, acuminate, 2-3 in. long, glabrous.

HAB.—Ava.

4. *A. catechu*, Willd.; Brand. For. Fl. 186 (*A. sundra*, Roxb.; Bedd. Sylv. Madr. t. 50).—*Sha*.—A tree (50—60 + 15—25 + 4—6), shedding leaves in H.S., the branchlets armed with paired, short, but sharp, usually curved or almost straight, blackish, often somewhat dilated stipulary spines, the younger parts more or less pubescent or almost glabrous; bark brown, cracked, peeling off in long flakes which remain hanging, and hence the trunk often appears somewhat scaly; cut red; leaves abruptly bipinnate, 4-6 in. long, with 10-20 pairs of pinnae, the rachis more or less pubescent or when full grown sometimes quite glabrous; leaflets in 20-40 pairs, sessile, linear, about 2 lin. long, rigidly chartaceous, blunt or acute, ciliate or quite glabrous; flowers small, yellow, sessile, forming more or less elongate, shortly pubescent or glabrous spikes arising solitary or by 2-3 from the axils of the leaves; calyx  $\frac{1}{2}$  a line long, toothed, pubescent or glabrous; corolla thrice or nearly twice as long as the calyx, glabrous or nearly so; pods linear-lanceolate, very flat, acuminate at both ends and tapering in a short stalk, 2-3 in. long, black or brown, often glossy; seeds compressed, greyish brown.

Var. 1. *Catechu proper*; young parts all slightly appressed pubescent, soon glabrescent; the stipulary spines usually recurved and blackish; leaves when full grown glabrous or the leaflets ciliate, the rachis slightly pubescent; spikes shorter and thicker, along with the calyx and petals more or less appressed pubescent; corolla about twice as long as the calyx.

Var. 2. *Sundra* (*A. sundra*, DC.); all parts glabrous or the very young shoots slightly pubescent; stipulary spines usually short and curved, blackish; leaves and their rachis when full grown quite glabrous; spikes elongate and slender, along with the calyx quite glabrous; corolla glabrous, about  $\frac{2}{3}$  longer than the calyx.

HAB.—Var. 1 common all over Ava and Prome, extending into the Irrawaddy zone of Pegu, especially in the dry forests, rather rare in the lower mixed and savannah forests: var. 2 apparently in Ava.—Fl. begin. of R.S.; Fr. C.S.—l.—SS.—CaS. All.

REMARKS.—Sap-wood yellowish white, varying in bulk according to age from 3 and more inches to 1 inch thickness, rather heavy, fibrous, but close-grained; the heart-wood similar, but dark-brown, very strong and durable; takes a fine polish. □'= $\frac{1}{2}$ 56-70. Employed for posts and uprights of houses, for spear and sword handles, bows, &c. There are several varieties according to Dr. Brandis, differing in shade, specific weight, and yield of kutch. The wood is considered more durable than teak, and is not attacked by xylophages. Recommended for railway sleepers. Kutch or catechu (*Terra japonica* of commerce) is extracted from the wood in large quantities. Exudes a blackish resin.

5. *A. ferruginea*, DC.; Braud. For. Fl. 185.—An evergreen (?) tree 20-30 ft. high, all parts glabrous, unarmed or more usually the branchlets armed with short glossy black stipulary prickles; bark dark-brown, deeply cracked; leaves unpaired-pinnate, on a slender 2-3 in. long petiole bearing a gland at the middle and between the insertion of the pinnæ, with 3 to 6 pairs of pinnæ, glabrous; leaflets in 10-20 pairs, unequally oblong, almost sessile with an obliquely rounded base, blunt or obliquely acute,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long by  $1\frac{3}{4}$ - $\frac{1}{2}$  lin. broad, 3-5-nerved at the base, chartaceous, glaucous green; flowers small, yellow, sessile, forming peduncled, glabrous, more or less elongate spikes in the axils of the leaves; calyx glabrous,  $\frac{1}{2}$  a line long; corolla twice as long, glabrous; pods linear-oblong, sessile or nearly so, with a thick tapering base, 4-6 in. long by 1 broad, flat, bluntish, opaque and laxly veined, brown; seeds flat, brown, glossy.

HAB.—Burma, without locality (taken up on Beddome's authority, who gives the Burmese name "sitnet" for it).

\* \* *Climbers. No stipulary prickles, but the branchlets along their whole length armed with recurved sharp prickles.*

6. *A. concinna*, DC.; Brand. For. Fl. 188.—*Soo-pwool-nway*.—A large scandent shrub, the stems and branches armed with numerous compressed short, sharp, recurved prickles, the young shoots more or less shortly pubescent; leaves abruptly bipinnate, 4-5 in. long, with 4-6 pairs of pinnæ, the rachis puberulous or almost glabrous, armed on the back with recurved prickles; leaflets in 10-20 pairs, sessile, dimidiate-linear-oblong, truncate at the broader base, blunt or bluntish, up to  $\frac{1}{2}$  in. long, membranous, glabrous or nearly so; flowers small, sessile, yellowish, in small heads of about  $\frac{1}{3}$  in. in diameter, borne on 1-1 $\frac{1}{2}$  in. long sparingly pubescent or densely puberulous peduncles arising solitary or by 2 or 3 from the axils of the leaves or from above the scars of the fallen ones; calyx more or less pubescent or almost glabrous; pods thick-fleshy, when dry wrinkled, 2 $\frac{1}{2}$ -4 in. long by  $\frac{3}{4}$  broad, linear-oblong and occasionally constricted between the seeds, tapering at the base, blunt with a thick point, slightly torose, glabrous, slowly dehiscent; seeds rather compressed, black.

HAB.—Frequent in the tropical and moister upper mixed forests all over Burma down to the Andamans.—Fl. March-Apr.—Fr. C.S.—s: l.—SS.—petrophilous.

7. *A. Intsia*, Willd.—A large scandent shrub, the branches armed with numerous recurved, black, small but sharp prickles, the branchlets more or less shortly rusty or tawny pubescent or tomentose; leaves abruptly bipinnate,  $\frac{1}{2}$ - $\frac{3}{4}$  ft. long, with 4-8 pinnæ, the

rachises more or less pubescent or almost tomentose and recurved-prickly; leaflets in 8-20 pairs, sessile, unequal, almost falcate-oblong, with a more or less rounded unequal base, more or less acute, about  $\frac{1}{2}$  in. long, chartaceous, glabrous, with a strong lateral nerve arising from the base; flowers small, yellowish, sessile, forming small globular heads of about  $\frac{1}{4}$  in. in diameter, borne on straight, tawny tomentose,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, naked peduncles solitary or by 2-4 clustered and forming a rather ample shortly tomentose panicle at the end of the branchlets; calyx about  $\frac{1}{2}$  lin. long, slightly pubescent, the corolla somewhat longer; pods linear-lanceolate or elongate-oblong, 3-5 in. long, very flat, with the borders somewhat thickened, often on the same plant gradually tapering or abruptly contracted in a short stalk, acuminate or blunt, brown, smooth; seeds compressed, blackish brown, glossy.

HAB.—Chittagong hills.

8. *A. pennata*, Willd.; Brand. For. Fl. 189.—*Soo-yit*.—A large scandent shrub, the branches and branchlets armed with numerous small but sharp, recurved, glossy, blackish prickles, the young branchlets slightly pubescent or almost glabrous; leaves abruptly bipinnate,  $\frac{1}{2}$ -1 ft. long, with 8-20 pairs of pinnae; the rachises glabrous or slightly pubescent, unarmed, or occasionally prickly; leaflets in 30-40 pairs, sessile, dimidiate-linear, 2-3 lin. long, blunt or nearly so, rigidly chartaceous, glabrous; flowers small, yellow, sessile, in small globular heads about the size of a pea, borne on  $\frac{1}{2}$ - $\frac{3}{4}$  in. long naked puberulous peduncles clustered and forming a more or less ample puberulous panicle at the end of the branches and in the axils of the upper leaves; calyx hardly  $\frac{1}{2}$  lin. long, glabrous; corolla somewhat longer; pod oblong-linear, acuminate or acute at both ends, shortly stalked, very flat, with the borders somewhat thickened, 4-5 in. long, glabrous, brown or blackish; seeds compressed.

HAB.—Common in all leaf-shedding forests all over Burma and adjacent islands.—Fl. R.S.; Fr. C. S.—L.—SS.— $\infty$ .

REMARKS.—Wood porous, brown, rather heavy.

9. *A. pruinescens*, Kz.—A large woody climber, armed with recurved thorns, the stems as thick as an arm, the young branchlets pruinose; leaves up to 10 in. long, the petiole rather short with a large gland far above the base; pinnae numerous, the rachis slightly pubescent and sparingly recurved prickly; leaflets in numerous pairs, sessile, dimidiate-linear, up to 6 lin. long, blunt, glabrous or ciliate; flowers small, yellow, sessile, in globose heads the size of a cherry, borne on tawny pubescent about an inch long peduncles arranged usually in long, axillary, recurved prickly racemes which are pruinose and usually pubescent while young; ovary

glabrous ; pods linear-oblong, acute at both ends, flat, with thickened sutures, pale-brown, glabrous, 4-6 in. long.

HAB.—Not unfrequent in the tropical forests of the Pegu Yomah ; also Ava hills.—Fl. Fr. C.S.—SS.=SiS., etc.

10. *A. cæsia*, WA. ; Brand. For. Fl. 189.—A large scandent shrub, the branches and branchlets terete, and more or less shortly and softly tawny or rusty pubescent, armed with numerous small but sharp recurved pubescent prickles ; leaves abruptly bipinnate,  $\frac{1}{2}$ -1 ft. long, with 7-15 pairs of pinnæ, the rachises softly pubescent or almost tomentose and often armed with recurved prickles ; leaflets in 15-40 pairs, from rhomboid to almost falcate-oblong, unequal, sessile, bristly acute or bluntish, with or without a minute mucro, 3-6 lin. long, rigidly chartaceous to almost membranous, while young on both sides (especially beneath) appressed pubescent, more or less glabrescent above, rarely also beneath ; flowers small, white, sessile, in small globular heads of the size of a large pea, borne on a tawny tomentose  $\frac{1}{2}$ - $\frac{3}{4}$  in. long peduncle, several together, clustered and forming an ample shortly tawny tomentose panicle at the end of the branchlets ; calyx hardly  $\frac{1}{2}$  lin. long, slightly pubescent ; corolla somewhat longer than the calyx ; pods oblong, often occasionally sinuate-constricted, more or less abruptly contracted in a short stalk, usually blunt with a point, very flat, with the borders somewhat thickened, shortly and minutely pubescent and hardly glabrescent ; seeds compressed, blackish.

HAB.—Not unfrequent in the tropical forests along the eastern slopes of the Pegu Yomah and Martaban.—Fr. C.S.—s: 1.—S S. = SiS., Metam.

### ALBIZZIA, Durazz.

Calyx bell-shaped or tubular, 5- or rarely 4-toothed. Corolla 5- or rarely 4-lobed, with a cylindrical tube. Stamens indefinite and usually very numerous and long, the filaments united in a longer or shorter basal tube enclosing the ovary. Pod linear or oblong, straight and flat, or rather thick and curved, either opening into 2 valves, or only along one suture or quite indehiscent, without pulp inside. Seeds orbicular to ovate, more or less compressed, the funicle long and filiform.—Trees or shrubs, unarmed, with abruptly bipinnate leaves. Flowers small, in globular or oblong heads or umbels or rarely in cylindrical spikes, often collected into terminal panicles.

× Pinnæ numerous (10-18) ; leaflets linear, 1-6 lin. long, in very numerous pairs.

○ Leaflets bluntish, the nerve central or nearly so ; flower heads small, in terminal panicles

*A. myriophylla.*

○ ○ Leaflets acuto or nearly so, the nerve marginal or nearly so.

Stipules very large, obliquely ovate, acuminate ; all parts more or less shortly pubescent

*A. stipulata.*

Stipules none or obsolete ; all adult parts glabrous or nearly so

*A. elegans.*

× × Pinnæ in 2-6 pairs; leaflets ovate to oblong,  $\frac{1}{2}$ -1½ in. long, in several pairs, blunt.

○ Leaflets sessile.

Calyx minute; corolla 1½ lin. long . . . . . *A. odoratissima*.

Calyx 1½ lin. long; corolla 4 lin. long . . . . . *A. Lebbeck*.

○ ○ Leaflets shortly petioluled; pinnæ in 4-3 pairs.

Leaflets  $\frac{1}{2}$ -1 in. long; pods tapering at the base, linear, smooth, brown . . . . . *A. procera*.

Leaflets 2½-4 in. long; pods stalked, oblong, veined, black . . . . . *A. Teymanni*.

× × × Pinnæ in a single pair; leaflets large, acuminate, in a few pairs only, glabrous; pods broad and flat . . . . . *A. lucida*.

1. *A. myriophylla*, Bth.—A small evergreen tree, the young shoots tawny and shortly pubescent; leaves abruptly bipinnate, 8-10 in. long, with 10 to 18 pinnæ, the rachises rusty puberulous; leaflets in 20-40 pairs, sessile; linear, slightly falcate, bluntish, ciliolate, 2-3 lin. long, rigidly chartaceous, glabrous; flowers small, white, sessile or nearly so, in small heads, on  $\frac{1}{2}$ -¾ in. long tawny puberulous peduncles clustered and forming larger or smaller panicles in the axils of the upper leaves and at the end of the branchlets; calyx tawny pubescent, minute; corolla about a line long, funnel-shaped, pubescent outside; pods linear-lanceolate, acuminate at the base, occasionally sinuate between the seeds, 2-3 in. long, very flat and thin, glossy brown, smooth.

HAB.—Tenasserim.—Fl. Apr.

2. *A. stipulata*, Boiv.; Bedd. Sylv. Madras t. 55; Brand. For. Fl. 178.—*Bo-me-za*.—An evergreen tree (100—120+60—80+8—12½), often shedding leaves in H.S., the young parts all shortly pubescent; stipules unusually large, 1-1½ in. long, obliquely cordate, acuminate, velvety pubescent, deciduous; leaves abruptly bipinnate,  $\frac{1}{2}$ -1½ ft. long, with 7 to 20, rarely fewer pinnæ, the rachises all shortly tawny pubescent; leaflets in 20 to nearly 50 pairs, sessile, falcate and unequal, oblong-linear, acute, 3-4 lin. long, membranous, slightly and minutely pubescent, ciliate, glaucous or almost whitish beneath, the midrib almost marginal; flowers small, white, almost sessile, in globular heads, on  $\frac{1}{2}$ -1 in. long shortly pubescent peduncles clustered or racemose and forming terminal, smaller, or larger shortly pubescent panicles at the end of the branchlets; calyx puberulous, about a line long; corolla pubescent, funnel-shaped, nearly 3 lin. long; pods linear-oblong, tapering at the base, more or less blunt, very flat with the sutures slightly thickened, 2½-3½ in. long, pale-coloured or pale-brown, smooth and rather glossy.

HAB.—Frequent in the tropical and moister upper mixed forests, ascending into the drier hill forests, up to 4,000 ft. elevation, from Ava and Chittagong down to Tenasserim.—Fl. Apr.-May; Fr. C.S.—s: 1.—SS.—Metam.—SiS, etc.

REMARKS.—Sap-wood broad, white, light, coarse-grained and fibrous; heart-wood dark-brown and heavy, takes fine polish. Good for cabinet-work, furniture, and similar purposes.

3. *A. elegans*, Kz.—An evergreen tree (80—100+50—70+7—8), the young shoots greyish or tawny puberulous; stipules minute, deciduous; leaves abruptly bipinnate, 1-1½ ft. long, with 7-14 pinnae, the rachises puberulous and glabrescent; leaflets in 20-25 pairs, somewhat falcate, linear-oblong, sessile, somewhat acute, thin chartaceous, when full grown glabrous, the midrib tolerably median; flowers and fruits unknown.

HAB.—Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah, as along the feeders of the Swa-choung, etc.—s.—SS.=SiS.

4. *A. odoratissima*, Bth.; Bedd. Sylv. Madr. t. 54; Brand. For. Fl. 175.—*Thit-ma-kyee*.—A tree (80—100+40—60+5—8), leafless in H.S., the young shoots almost glabrous or pubescent; bark thick, blackish grey, rough, peeling off in small, irregular, coarse flakes; cut reddish brown; leaves abruptly bipinnate, up to a foot long, with 3 to 8 pinnae, the rachises more or less glabrous or shortly and softly pubescent; leaflets in 8-25 pairs, sessile, obliquely oblong and very unequal, sometimes falcate, blunt or bluntish, rarely acute, ½-¾ in. long, entire, rigidly chartaceous, while young often appressed pubescent, when full grown glabrous and more or less glaucescent beneath; flowers small, yellowish, sessile, in small heads, borne on 1-1½ in. long shortly pubescent peduncles clustered and arranged into more or less ample terminal shortly and softly pubescent panicles; calyx minute, pubescent; corolla funnel-shaped, 1½ lin. long, appressed-pubescent outside; pods linear-oblong, 3-4 in. long by about 1 in. broad, very flat with the sutures slightly thickened, blunt with a stylose mucro, contracted in a very short stalk, blackish or brownish black, smooth and glossy.

HAB.—Frequent in the mixed and dry forests all over Prome, Pegu, and Martaban down to Tenasserim.—Fl. H.S.; Fr. C.S.—s×L.—SS.=∞SiS.

REMARKS.—Heart-wood dark-coloured, turning almost black with age, strong and heavy, rather loose-grained, takes good polish; sap-wood white, perishable.

5. *A. Lebbek*, Bth.; Bedd. Sylv. Madr. t. 53; Brand. For. Fl. 176.—*Kokko*.—A tree (60—70+30—40+6—7), leafless in H.S., the young shoots puberulous or almost glabrous; bark whitish; leaves abruptly bipinnate, with 4-2 (rarely 1) pairs of pinnae, the rachis glabrous or rarely puberulous; leaflets in 5-9 pairs, on a very short (less than ½ a lin. long) petiolule, obliquely oval-oblong to oblong and ovate-oblong, unequal, 1-1½ in. long, retuse or blunt, entire, almost chartaceous, glabrous or rarely sparingly pubescent beneath, somewhat glaucescent beneath; flowers rather small, white, on a line long or somewhat longer minutely puberulous pedicels, forming globular umbels on 1-2½ in. long glabrous or puberulous peduncles arising solitary from the axils of the upper leaves or sometimes arranged in spurious short racemes at the end of the leafless branchlets; calyx tubular, about 1½ lin. long, glab-

rons or puberulous; corolla glabrous, about 1 lin. long; pods 1-1 ft. long, linear-oblong, bluntish at both ends or rarely acuminate, very compressed and flat, with the sutures slightly thickened, 1-1½ in. broad, smooth, yellowish, glossy.

HAB.—Frequent in the tropical and moister upper mixed forests from Pegu and Martaban down to Tenasserim, up to 2,000 ft. elevation; also Prome (the pubescent dry-country form) along chaungs.—Fl. Apr.-May; Fr. C.S.—x1.—SS.=  $\alpha$ SiS.

REMARKS.—Sap-wood white, coarse-fibrous; heart-wood blackish brown, close-grained, rather heavy, coarsely fibrous, but compact, takes fine polish. Good for furniture and carriage axle, also for building purposes. Yields a pellucid yellowish resin.

6. *A. procera*, Bth.; Bedd. Sylv. Madr. 96; Brand. For. Fl. 175, t. 26.—*Sit-pen*.—A tree (80—90 + 10—60 + 7—8), shedding leaves in H.S., all parts glabrous, or the very young shoots slightly pubescent; bark grey; cut red; leaves abruptly bipinnate, 1-1½ ft. long, with 4-3 pinnae, the rachis glabrous or nearly so; leaflets in 6-8 pairs, on a very short (less than ½ lin. long) puberulous or glabrous petiole, obliquely oval to oval-oblong, unequal, blunt or somewhat acute, ½ to nearly 1 in. long, entire, rigidly chartaceous, beneath slightly and shortly appressed pubescent and glaucous; flowers small, white, sessile, in small globular heads borne on ½-¾ in. long glabrous peduncles clustered racemose and forming panicles in the axils of the upper leaves and larger glabrous or slightly puberulous ones at the end of the branchlets; calyx about a line long, glabrous; corolla funnel-shaped, about 2 lin. long, glabrous or nearly so; pods linear, 3-5 in. long by ½-¾ in. broad, tapering at the base, acute, very flat, with the sutures slightly thickened, brown, smooth.

HAB.—Frequent in the mixed and dry forests all over Pegu and Martaban down to Tenasserim, entering also the tidal savannahs.—Fl. May-June; Fr. C.S.—1.—SS.=Metam. SiS. All. Sul. (?)

REMARKS.—Sap-wood white or brownish, rather light, coarsely fibrous, but tolerably close-grained; heart-wood brown to blackish brown, rather heavy, close-grained, streaked, hard, strong and durable, takes fine polish. Good for house-building, cabinet-work, etc.

7. *A. Teysmanni*, Kz.—A lofty tree, the leaf-buds puberulous; leaves abruptly bipinnate, about 2 ft. long, glabrous, the rachis and the petiole rather terete, about a foot long, glandless; pinnae in 4 pairs, up to a foot long; leaflets in 8-9 pairs, very like those of *Cassia fistula*, obliquely or almost rhomboid-ovate, very shortly and slenderly petioluled, obtuse at the unequal base, 2½-4 in. long, bluntnish and usually notched, chartaceous, entire, glabrous; pods oblong, narrowed in a stalk, 5-6 in. long, obliquely acute, almost turgid, black, glabrous, the valves coriaceous, barely

thickened on the margins, veined; seeds 4-6, elliptically orbicular, rather compressed,  $\frac{1}{2}$  in. long, brownish.

IIAB.—Adjoining Siamese province of Radboorec.—Fr. H.S.

REMARKS.—Yields the best timber of Siam.

7. *A. lucida*, Bth.; Brand. For. Fl. 174.—*Than-that-pen*.—A tree (50—60 + 25—30 + 5—6), remaining stunted on impermeable strata, leafless at the begin of H.S., all parts quite glabrous; bark very thin, greyish, covered with little corky pustules; leaves abruptly bipinnate with only a single pair of pinnæ, glabrous; leaflets usually in 2 pairs, oval to elliptically oblong and oblong-lanceolate, on a 1-2 lin. long petiolule, bluntish acuminate, 2-4 in. long, chartaceous; flowers small, yellowish, sessile or nearly so, in small heads, borne on  $\frac{1}{2}$ -1 in. long glabrous peduncles, clustered and forming terminal glabrous panicles; calyx nearly a line long, minutely toothed, the 2 lin. long corolla outside minutely pubescent; pods 3-6 in. long, linear-oblong, bluntish at both ends, very flat, with the sutures somewhat raised, pale-brown, smooth and somewhat glossy.

IIAB.—Common in the dry forests of Ava and Prome; rather rare in the lower mixed forests of Pegu.—Fl. Apr.; Fr. C.S.—s x l. SS.—SiS. Lat. CaS.

REMARKS.—Sap-wood white, coarsely fibrous; heart-wood brown, compact.

## PITHECOLOBIUM.

Characters and habit of *Albizzia*, but the pods circinnately or screw-like twisted or curved. Seeds without an arillus.

× Flowers pedicelled, in head-like umbels or racemes.

Pod-lobes 1 in. broad and long; branchlets terete; leaves with a single pair of pinnæ

*P. lobatum.*

Branchlets sharply cornered; pinnæ 2-4; leaflets in 4-8 pairs

*P. angulatum.*

× × Flowers sessile, in small heads; shrub, pinna in a single pair

*P. glomeriflorum.*

1. *Pithecolobium lobatum*, Bth.—*Tanyeng-pen*.—An evergreen tree (40—50 + 15—25 + 3—4), all parts glabrous; bark 2-3 lin. long, a little rough, minutely fissured, grey; cut dryish, red-brown; leaves abruptly bipinnate, with a single pair of pinnæ on an in. long petiole, glabrous; leaflets in 2-3 pairs, ovate to broad-lanceolate, on a 1-2 lin. long petiolule, long and bluntish acuminate, 2-5 in. long, chartaceous, glabrous and glossy; flowers small, white, sessile or nearly so, forming little heads on short but slender minutely and sparingly puberulous peduncles, clustered or solitary and arranged in smaller or larger axillary and terminal indistinctly pubescent panicles; calyx glabrous, nearly a line long, the teeth ciliate; corolla about  $1\frac{1}{2}$  lin. long; pods screw-like twisted, almost down to the ventral suture lobate-sinuate between the seeds, 3-5 in.

long, glabrous, coriaceous, the seed-bearing lobes almost orbicular, about an inch long and broad.

HAB.—Rather frequent in the tropical forests and along chougns in the moister upper mixed forests from the Pegu Yomah and Martaban down to Tenasserim. Also frequently cultivated by the Burmese.—Fl. Apr.-May; Fr. March-Apr.—S.—SS.—Metam. *SiS*.

REMARKS.—Wood coarsely fibrous, but close-grained, rather heavy, the sap-wood small, white, soon attacked by xylophages; heart-wood brown, exudes a blackish resin.

2. *Pithecolobium angulatum*, Bth.—An evergreen tree (25—30+8—15+1½-2), the branchlets sharply 4-5-cornered, the young shoots tawny pubescent; leaves abruptly bipinnate, 1-1½ ft. long, with usually 4-3 rarely 2 pinnae, the rachises 4-3-angled, while young tawny pubescent; leaflets of the lower pinnae in 2-3, those of the upper ones in 4-8, pairs, on very short, thick, pubescent petiolules, more or less rhomboid-oblong to rhomboid-ovate, acuminate, 1-2 in. long, while young membranous or chartaceous and above sparingly, beneath softly tawny pubescent, when full grown thin coriaceous and especially above glabrescent; flowers small, white, on slender 1-1½ lin. long puberulous pedicels, in umbel-like heads lengthening into short racemes borne on ¼-¾ in. long clustered peduncles and forming a more or less ample, rusty or tawny pubescent panicle in the axils of the upper leaves and at the end of the branchlets; calyx ½ a line long, tawny pubescent; corolla 1½ lin. long, pubescent outside; pods screw-like, circinnate-twisted, linear-oblong, sinuate-contracted between the seeds, coriaceous, while young velvety, soon glabrescent.

HAB.—Frequent in the drier hill and pine forests of the Martaban hills down to Upper Tenasserim, at 4,000 to 6,000 ft. elevation.—Fl. March-Apr.; Fr. Apr.-May—1.—SS.—Metam.

3. *P. glomeriflorum*, Kz.—A shrub, 2-5 ft. high, the young shoots shortly puberulous, the branchlets slightly angular or terete; leaves abruptly bipinnate, with a single pair of pinnae on a 1-1½ in. long petiole, the rachises hardly angular, and especially while young puberulous; leaflets in 3 or rarely 2 pairs, on very short puberulous petiolules, obliquely oblong to slightly rhomboid-lanceolate, shortly acuminate with a mucro, 1-2 in. long, thin but rigidly coriaceous, glabrous or nearly so when full grown, beneath glaucescent and conspicuously pubescent on the midrib and the nerves; flowers small, greenish white, sessile, in small heads of the size of a very small pea, on slender ½-1 in. long puberulous peduncles, clustered or solitary, forming slender puberulous racemes in the axils of the leaves or collected into leafy terminal panicles; calyx less than ½ a line long, pubescent; corolla cleft as far down as the calyx, pubescent outside, about 1½ lin. long.

HAB.—Not unfrequent in the drier hill forests of the Martaban hills east of Tounghoo, at 4,000 to 7,000 ft. elevation.—Fl. March.—s—l.  $\times$  SS. = Metam.

### INGA, Willd.

Flowers 5- rarely 6-merous, mostly hermaphrodite. Calyx tubular or bell-shaped, toothed or shortly lobed. Corolla tubular or funnel-shaped, valvate. Stamens numerous, long-exserted, united at the base or high up into a tube; anthers small. Ovary many-ovuled; style subulate, with a terminal small or capitate stigma. Pod straight or almost incurved, more or less dehiscent. Seeds imbedded in pulp or with an arillus-like large strophiole.—Trees or shrubs, with abruptly pinnate or bipinnate leaves. Stipules small and caducous, or rarely larger and persistent or spine-like. Flowers in peduncled heads or spikes.

4. *I. dulcis*, Willd. (*Pithecolobium dulce*, Bedd. Sylv. Madr. t. 188; Brand. For. Fl. 173).—*Kway-tanyeng*.—An evergreen tree (50—60+25—30+4—5), glabrous, or the very young branchlets greyish puberulous, the branchlets armed with short, straight, paired, stipulary spines; leaves abruptly bipinnate with a single pair of pinnae only, on a slender  $\frac{1}{2}$ –1 in. long petiole, glabrous; leaflets in a single pair, sessile, unequal, almost dimidiate-obovate to half-elliptical, blunt, very variable in size (from  $\frac{1}{2}$ –1 in. long), chartaceous, glabrous, glaucescent; flowers small, whitish, sessile, in small globular heads either sessile or on very short greyish puberulous peduncles forming greyish puberulous racemes in the axils of the leaves, the racemes usually collected into a terminal panicle; calyx a line long, grey-tomentose; pods 4–5 in. long, linear-oblong, fleshy coriaceous, reddish and white, turgid, much twisted; seeds glossy black, covered with a thick, firmly spongy, rather dry but edible arillus.

HAB.—Cultivated only in the larger stations, as Rangoon.—Fl. C.S.; Fr. H.S.

### ROSACEÆ.

Flowers usually regular and hermaphrodite. Calyx free and enclosing the ovaries or adnate to the ovary, the limb equal or (in *Chrysobalanæ* unequal), 4- rarely 5- or more-lobed, with the addition (in a few genera) of as many external accessory lobes. Disk filling the calyx tube. Petals as many as true calyx-lobes, equal or rarely unequal, imbricate. Stamens indefinite, rarely few, free, inserted with the petals at the base of the calyx-lobes. Ovary of 1, 2 or more carpels, usually distinct at the time of flowering, but sometimes combined into a single 2–5-celled inferior ovary, with 1 or 2 rarely more ovules in each carpel; styles elongate or sessile; stigmas distinct. Fruit various, superior or more or less inferior, sometimes enclosed in the persistent calyx-tube, fleshy or dry, indehiscent or capsular, or the carpels collected on a fleshy or dry

torus. Albumen none, rarely present.—Trees, shrubs, or under-shrubs, with simple or compound leaves. Stipules usually present. Flowers in axillary or terminal cymes or solitary, rarely in simple racemes.

An order of about 24 Burmese species, several of them trees. Apple, pear, sorb, medlar, quince, peaches, nectarines, plums, cherries, almonds, strawberries, raspberries, blackberries, and many other fruits reckon amongst this order. Astringent properties prevail. Some of them excel for the beauty of their flowers, like the roses, etc.

\* *Ovary and fruit superior.*

× Calyx or its lobes usually deciduous, without bractlets.

Carpel solitary; fruit a drupe; ovules 2. Trees or shrubs, with simple leaves.

○ Flowers irregular; style basilar; ovules ascending; radicle inferior

*Parinarium.*

○○ Flowers regular; style nearly terminal; ovules suspended; radicle superior.

Calyx 5-lobed; petals 5; drupe straight, with a bony putamen . *Prunus.*

Calyx 5-15-toothed; petals 5-10, minute or none; drupe often transversely oblong, coriaceous . *Pygeum.*

× × Calyx-lobes usually persistent, with or without bractlets. Carpels usually many. Fruit various.

○ Calyx-lobes without bractlets; ovules 2; stamens and carpels many; shrubs or undershrubs . *Rubus.*

○○ Calyx-lobes with 5 bractlets. Ovule solitary.

Receptacle in fruit fleshy; herbs with 3-foliolate leaves . *Fragaria.*

Receptacle in fruit dry; herbs or undershrubs with compound leaves . *Potentilla.*

\*\* *Ovary enclosed in the calyx-tube or inferior. Ripe carpels within the persistent calyx-tube.*

○ Achens many, 1-seeded, dry, enclosed in the fleshy calyx-tube; shrubs, with unpaired-pinnate leaves . *Rosa.*

○○ Ovary-cells or carpels 1-5, 2-ovuled. Fruit an apple, containing a 2-5-celled putamen, or a 1-5 pyrenous drupe.

Apple 2-5-celled, the cells separate, the endocarp usually cartilaginous; deciduous trees or shrubs . *Pirus.*

Berry 1-5-celled, the endocarp and septa thin; evergreen trees . *Eriobotrya.*

## PARINARIUM, Juss.

Flowers often polygamous or hermaphrodite, the females with long filiform staminodes, the males with a small abortive ovary. Calyx-tube obliquely excavated, the 5 lobes imbricate. Petals minute or none. Stamens 10 or more, all fertile or some of them without anthers, hypogynous, the filaments short and persistent. Ovary of a single carpel sessile on the bottom of the calyx, 1-celled with 2 erect ovules; style lateral from the base; stigma large peltate. Drupe succulent, rarely almost dry, surrounded at the base by the persistent calyx, the stone bony, usually 2-seeded. Albumen none.—Trees or shrubs, with alternate simple leaves.

Stipules minute or none. Flowers often polygamous, solitary or more usually in axillary or terminal bracted racemes or panicles.

1. *P. Sumatranum*, Bth.—A middling-sized tree, the younger shoots all tawny pilose; leaves of the shoots longer acuminate, more membranous, beneath densely and shortly white or glivous tomentose, the older ones oblong or broadly oblong, on a short thick tomentose petiole, blunt or apiculate, entire or nearly so, firmly coriaceous, glabrous above, minutely greyish tomentose and strongly nerved and net-veined, very variable in size, but usually 4-6 in. long; flowers shortly pedicelled, villous, forming tomentose or pubescent racemes or thyrsoïd racemes in the axils of the leaves and sometimes at the end of the shoots; the lower bracts oblong-lanceolate and puberulous, those further up gradually smaller and shorter; stamens about 15, forming a half-circle, the lower fertile (7-8) ones short, the upper sterile ones without anthers and united into a minutely toothed crown; ovary scaly and minutely hairy; drupes oblong, the size of a plum, rough from lenticels and scales, yellow, the mesocarp sappy and edible.

HAB.—Burma, without locality (probably Tenasserim).

## PRUNUS, L.

Flowers hermaphrodite. Calyx-tube from tubular to urceolate, filled up with the glandular disk. Sepals 5 (rarely 4 or 6), inserted at the throat of the tube, deciduous, imbricate. Petals as many as sepals, or none, deciduous, imbricate. Stamens 10-20, or sometimes more. Carpel solitary (rarely 2 or more), free, inserted on the bottom of the calyx-tube, with 2 descending ovules; style terminal. Fruit a drupe, more or less sappy, the putamen hard, perforated, usually 1-rarely 2-seeded. Albumen thin or none.—Trees or shrubs, with alternate simple leaves. Stipules present. Flowers solitary or more usually corymbose or racemose.

\* Fruits large, tomentose; leaves deciduous, serrulate . . . *P. Persica*.

\*\* Fruits smooth.

Leaves deciduous, serrate; flowers in poor corymbs; calyx-tube about 4 lin. long . . . *P. Puddum*.

As preceding; flowers small, by threes; calyx-tube only 1-1½ lin. long . . . *P. triflora*.

Leaves persistent, entire; flowers racemose . . . *P. Martabanica*.

1. *P. Persica*, Bth.; H.f. Brand. For. Fl. 191.—A leaf-shedding small tree, the leaf-buds sparingly pilose; leaves oblong-lanceolate to lanceolate, rounded and 2-glandular at the base, crenate-toothed, on a 3-4 lin. long petiole, more or less acuminate, 2-3½ in. long, chartaceous, glabrous; flowers showy, white or pale-rose-coloured, shortly pedicelled, singly arising from imbricate-scaled buds;

calyx-tube glabrous, the lobes elliptical, blunt, nearly 8 lin. long, woolly villous along the borders and inside; petals obovate,  $\frac{1}{2}$  in. long; drupes the size of a large plum, ovoid, pointed, glivous tomentose, fleshy and edible.

HAB.—Cultivated in Ava about Bhamo and in the Kakhyen hills, up to 3,500 ft. elevation.—Fl. Febr.-March; Fr. June-July.

2. *P. triflora*, Roxb.—A small bushy tree, shedding leaves in C.S., all parts glabrous; bark smooth, blackish; leaves obversely lanceolate, 2-glandular at the acuminate base, on a slender petiole about  $\frac{1}{2}$  in. long, shortly acuminate, minutely crenulate, 2-3 in. long, membranous, glabrous; stipules lanceolate, glandular-fringed; flowers rather small, white, on slender glabrous pedicels  $\frac{1}{2}$  in. long, usually arising by threes from every leaf-bud; calyx glabrous, the tube turbinate, the lobes longer than the tube, more than a line long, ovate, acute, glandular on the margins; petals  $\frac{1}{2}$  in. long, broadly oboval, very shortly clawed; filaments about 30; stigma large; drupes cordate-ovoid, the size of a plum, dark-purple, pruinose, grooved on one side, the pulp pale-reddish yellow.

HAB.—Ava hills.

3. *P. Puddum*, Ldl.; Brand. For. Fl. 194.—A leaf-shedding tree, all parts glabrous; leaves lanceolate, rounded at the 3-4-glandular base and somewhat narrowed in a 4-5 lin. long petiole, long-acuminate, 2-3 in. long, sharply and usually duclicately serrate, glabrous, chartaceous; flowers middling-sized, rose-coloured, on  $\frac{1}{2}$  in. long pedicels forming a few flowered glabrous much-bracted corymb above the axils of the fallen leaves; calyx glabrous, the tube bell-shaped-tubular, about 4 lin. long, the lobes short, acute; drupes globular, the size of a small cherry, on a long pendulous pedunclo, smooth, yellow, dark-red on the sun-side.

HAB.—Ava, Kakhyen hills, east of Bhamo.

3. *Pr. Martabanica*, Kz.—An evergreen tree (50—60 + 20—30 + 6—7), all parts quite glabrous; bark very thin, fibrous, brown; leaves from elliptically oblong and oblong to ovate-oblong, rounded or acuminate at the base, on a terete sulcate petiole  $\frac{1}{2}$  or more usually  $\frac{1}{2}$  in. long, acuminate, 5-7 in. long, entire, firmly membranous or almost coriaceous, quite glabrous and glossy above, beneath sprinkled with pellucid, in a dried state black, dots; flowers small, white, on 2 to 3 lin. long pedicels, forming axillary, glabrous, or puberulous racemes of about  $1\frac{1}{2}$  to 2 in. length; petals about a line long; drupes rather dry, elliptically oblong,  $\frac{3}{4}$ -1 in. long, smooth, the putamen thin, hard, almost crustaceous.

HAB.—Rather frequent in the tropical and moister upper mixed forests of the Andamans; also Tenasserim.—Fr. May.—a.—SS.—SiS.

REMARKS.—Wood uniformly dark-yellow, rather coarse, fibrous, very heavy.

## PYGEUM, Gaertn.

Flowers hermaphrodite or polygamously dioecious. Calyx-tube concave. Sepals 5-15, tooth-like, short. Petals as many, small, conform with the sepals, or none; stamens 10-20. Ovary sessile, 1-celled, with 2 descending ovules; style terminal with a capitate stigma. Fruit a dry drupe, usually transversely oblong, 1-seeded. Seeds transversely oblong. Albumen none.—Evergreen trees or shrubs, with alternate simple leaves. Stipules small, deciduous. Flowers in axillary and lateral racemes.

× Ovary and leaves beneath more or less tawny villous . . . *P. arboreum*.

×× Ovary glabrous or sparingly hirsute.

Quite glabrous; nerves and veins conspicuous, all deeply immersed, and the surface of the leaves appearing almost wrinkled . . . . . *P. acuminatum*.

Younger branchlets, petioles, and nerves beneath pubescent; nerves and veins thin, little visible . . . . . *P. persimile*.

1. *P. arboreum*, Endl.—A tree, the younger branches and buds rusty tomentose, the older ones glabrous and lenticellate; leaves ovate-oblong to broadly oblong, shortly cuspidate, on a 2-4 lin. long brown tomentose petiole, entire or nearly so, 4-6 in. long, rigidly chartaceous or almost coriaceous, above glabrous or rusty tomentose, on the impressed conspicuous nerves almost wrinkled, beneath more or less brown-pubescent or almost tomentose; flowers small, on 1-1½ lin. long pedicels, forming rusty tomentose 2-3 in. long racemes arising usually by 2 or 3 from above the axils of the fallen leaves; calyx-teeth minute; petals hardly longer, villous; ovary densely rusty villous; drupes transversely oblong and almost didymous, nearly ½ an in. across, covered with fugaceous rusty-brown stiff hairs and soon glabrescent.

HAB.—Martaban hills down to Tenasserim, at 3,000 to 4,000 feet elevation.

2. *P. acuminatum*, Colebr.—A large tree with a trunk of 5-6 ft. girth, the leaf-buds puberulent; leaves from ovate and oblong-lanceolate to broadly oblong, on a glabrous, slender petiole 3-4 lin. long, usually unequally acute at the base, entire or nearly so, shortly acuminate or cuspidate, rigidly chartaceous, 4-5 in. long, glabrous, with the nerves and veins very conspicuous and impressed, strongly net-veined and almost wrinkled, beneath rusty-coloured with the nerves sharply prominent; flowers small, on 1½ lin. long pedicels, in puberulous 1-2 in. long, racemes elongating in fruit and arising singly from the axils of the leaves and from the branches; ovary glabrous or nearly so; drupes transversely oblong, glabrous, nearly ¾ in. broad.

HAB.—Chittagong.

REMARKS.—Wood red, adapted for cabinet-work.

3. *P. persimile*, Kz.—An evergreen tree, the younger branchlets slightly appressed pubescent or puberulous; leaves elliptical to elliptically lanceolate, on slender rusty-pubescent petioles about 8 lin. long, obtuse at the base, bluntish and often very long acuminate, entire, 2-3½ in. long, almost membranaceous, above glabrous or minutely pubescent on the impressed thin nerves, beneath appressed pubescent along the midrib; racemes densely tawny tomentose or almost woolly, arising usually by 2-3 from above the scars of the fallen leaves or irregularly from the branches; pedicels only ¼ lin. long; calyx-tube short, urceolate, like all other parts tawny tomentose; ovary densely tawny hirsute; style long, exserted, the stigma broad.

HAB.—Tensasirim.

## RUBUS, L.

Calyx open, 5-lobed, the lobes without external accessory bracts, imbricate. Petals 5. Stamens usually indefinite, inserted on the mouth of the calyx; filaments filiform; anthers didymous. Carpels indefinite, each with 2 suspended ovules, of which one abortive; style terminal. Fruit a head of succulent rarely dry carpels forming usually a spurious granulated berry round the dry or spongy receptacle.—Shrubs, usually scrambling and prickly, rarely erect, with simple, lobed, or compound leaves. Flowers axillary or in terminal leafy panicles.

\* Carpels few (only 3-6), dry; leaves simple . . . . . *R. pyrifolius*.

\*\* Carpels numerous, forming a stumpy spurious berry.

○ Leaves simple or lobed.

+ All parts and leaves beneath covered with a tomentum more or less mixed with longer hairs.

Calyx-lobes entire.

Bracts and stipules entire or subulate-toothed, sometimes very deeply so, and then the lobes very short . . . . . *R. rugosus*.

Bracts and stipules pinnately cut, the segments long, thin, and often filiform . . . . . *R. Moluccanus*.

++ All parts, except inflorescence, without tomentum, rather glabrous or pubescent; calyx-lobes pectinate-toothed . . . . . *R. ferax*.

○○ Leaves digitately or pinnately compound.

+ Leaves digitately 3- or 5-foliolate; leaflets green, slightly pubescent or glabrescent . . . . . *R. pentagonus*.

++ Leaves pinnately 3-foliolate or pinnate.

Leaves pinnately 3-foliolate; leaflets beneath white or yellowish tomentose; flowers white; fruits glabrous . . . . . *R. flarus*.

Leaves unpaired-pinnate; leaflets beneath white or yellowish tomentose; flowers red or rose-coloured; fruits tomentose . . . . . *R. lasiocarpus*.

Leaves unpaired-pinnate; leaflets uniformly green; flowers white; fruits glabrous . . . . . *R. rosafolius*.

1. *R. pyrifolius*, Sm.—A large scrambling shrub, more or less sprinkled with minute recurved prickles, the branchlets terete,

tomentose or pubescent; leaves oblong to elliptically rarely ovate-oblong, acuminate or acute, on a short recurved-prickly villous petiole 2-4 lin. long, obtuse or rounded at the base, not, or rarely coarsely serrate-lobed, toothed, 3-5 in. long, rather coriaceous, the pubescent nerves excepted glabrous, or the veins beneath sprinkled with hairs and the midrib armed with a few recurved prickles; flowers white, on slender 2-3 lin. long pubescent pedicels, forming pubescent tomentose panicles in the axils of the upper leaves and more ample ones at the end of the branches; bracts and stipules pinnatifid, the segments linear-subulate, slightly pubescent; calyx velvety-tomentose or pubescent, the lobes entire, subulate-acuminate; petals nearly half as long as the calyx-lobes; carpels as large as a pepper-kernel, by 3-6 on the short villous torus, ovate, acuminate, glabrous, succulent, red.

HAB.—Ava, Kakhyen hills.—Fl. Fr. March.

2. *R. Moluccanus*, L.—A large scrambling shrub, armed with numerous small recurved prickles, the branches and petioles terete and clothed with a short rusty or whitish woolly down often mixed with longer hairs, or softly pubescent; leaves from broadly cordate-ovate to cordate-rotundate, on a tawny pilose prickly petiole  $1\frac{1}{2}$  to 2 in. long, shortly and broadly 3- or 5- rarely 7-lobed, with the lobes blunt or acute (the basal ones diverging or converging), toothed or serrate-toothed, 3-4 in. long, acute or sometimes long-acuminate, above more or less wrinkled and rough from inconspicuous hairs, rarely pubescent, beneath lacunose-net-veined, rusty or whitish tomentose, and on the principal nerves usually armed with a few straight prickles; flowers white, on 2-3 lin. long pedicels, irregularly clustered and shortly panieled in the axils of the leaves, the upper ones forming a terminal usually very silky villous panicle; bracts and stipules very deciduous, deeply pinnatifid, the segments linear or filiform; calyx densely appressed hirsute or simply velvety, the lobes acuminate or acute, 3-4 lin. long, fruit almost globular, bright-red, glabrous, slightly acid.

HAB.—Frequent in the drier hill forests and hill toungyas of Martaban; also Ava hills.—Fl. Feb.-March.—I.—SS.=Metam.

3. *R. ferox*, Wall.—A tall scrambling shrub, armed with short recurved prickles, the terete branches and petioles tawny pubescent; the older ones more or less glabrescent; leaves from cordate-ovate to cordate-oblong, acuminate, on a 2-3 in. long more or less prickly pubescent petiole, usually shortly 3-5-lobed, with the lobes obsolete and blunt (or in luxuriant forms acute), flat, unequally and sharply serrate-toothed, membranous, 4-6 in. long, sprinkled with a few hairs or almost glabrous, the principal nerves often pubescent and beneath sparingly prickly; flowers white, on 4-5 lin. long pubescent

pedicels, forming irregular tawny pubescent racemes or short panicles in the axils of the leaves or loose elongate panicles at the end of the branches; calyx canescent or velvety and sparingly appressed hirsute, the lobes acuminate, either all or the 3 larger ones pectinate-toothed, the teeth more or less linear or subulate; fruits globular, glabrous, of the length of the sepals.

HAB.—Burma, probably Ava.

4. *R. pentagonus*, Wall.—A large scrambling shrub, armed with compressed, strong, recurved prickles, the branchlets glabrous and terete; leaves digitately 3- or 5-foliolate, on a  $1\frac{1}{2}$ -2 in. long sulcate more or less pilose petiole; leaflets lanceolate to broadly lanceolate (especially the median one), cuneate at the base, sessile, acuminate or caudate-acuminate, irregularly serrate-toothed, membranous, turning chartaceous, 2-3 in. long, glabrous, with the nerves tawny pubescent, or both surfaces shortly appressed pubescent and the nerves pilose, the midrib beneath sparingly prickly; flowers white, on moderately long glandular-pilose pedicels, solitary or in poor axillary or terminal peduncled panicles; bracts and stipules linear, glabrous or glandular, the former often somewhat cut or cleft; calyx velvety and, while young, appressed bristly hirsute, the lobes broadly lanceolate, subulate-acuminate, white-tomentose inside; fruits glabrous, sappy, red, shorter than the calyx.

HAB.—Not uncommon along hill streams in the damp hill forests of the Nattong hills, Martaban, at 6,000 to 7,200 ft. elevation.—Fl. March-Apr.—s.—SS.—Metam.

5. *R. flavus*, Ham.; Brand. For. Fl. 197.—A bushy erect shrub, 3-4 ft. high, armed with scattered strong recurved prickles, the branches somewhat 5-cornered, covered with a whitish or yellowish pubescence intermixed with numerous long, spreading, brown, bristly hairs; leaves pinnately 3-foliolate, on an 1-2 in. long pubescent prickly petiole; leaflets obovate or almost orbicular, the lateral ones almost sessile, truncate or rounded and usually mucronate, serrate-toothed, firmly chartaceous, very variable in size, usually 1-2 in. long, strongly parallel-nerved (the nerves and veins impressed on the upper side), glabrous above, beneath densely and shortly tomentose-pubescent, whitish or yellowish, rarely green; flowers white, on slender pubescent and spreadingly setose pedicels, forming long-peduncled corymbs in the axils of the upper leaves and arranged into larger or smaller panicles at the end of the branches; bracts and stipules linear-subulate, pubescent; calyx velvety pubescent, often bristly towards the base, the lobes broad and more or less acute; petals sparingly appressed pubescent, longer than the calyxlobes; fruits hemispherical, glabrous, yellowish, shorter than the calyx.

HAB.—Martaban and Ava hills.—Fl. Febr.-March.

6. *R. lasiocarpus*, Sm.; Brand. For. Fl. 198.—A large scrambling or decumbent shrub, armed with straight sharp prickles, the younger branchlets puberulous or pubescent; leaves unpaired-pinnate, the rather short petiole and rachis terete, pubescent and armed with recurved prickles; leaflets in 4-3 (the upper ones in fewer) pairs with an odd one, almost sessile, oblong to oblong-lanceolate and ovate, acuminate or acute, rarely blunt, irregularly and rather coarsely serrate, above green and glabrous or appressed pubescent, beneath covered with a white or yellowish, short, woolly tomentum, and strongly parallel-nerved; flowers red or rose-coloured, on rather long or short densely pubescent pedicels, forming rather dense, pubescent, short, corymbose panicles at the end of the branches, or long-peduncled poor corymbs in the axils of the leaves; bracts and stipules linear, entire; calyx pubescent-tomentose, the lobes acuminate or subulate-acuminate; petals shorter than the calyx, rotundate; fruits hemispherical, longer than the calyx, reddish, densely often greyish puberulous.

HAB.—Martaban, Karen hills.

7. *R. rosæfolius*, Sm.; Brand. For. Fl. 198.—A prostrate or ascending shrub, armed with numerous sharp straight prickles, the branches terete, sometimes somewhat pruinous and more or less covered with very long dark-coloured stiff hairs bearing on their curved apex a conspicuous gland, rarely the branches all glabrous or shortly glandular-pubescent; leaves unpaired-pinnate, the petiole and rachis similarly clothed like the branches, but the prickles hooked-recurved; leaflets usually in 3 (rarely in 4-2) pairs with an odd one, very shortly petioluled, ovate- or oblong-lanceolate, acuminate, coarsely and usually irregularly serrate-toothed, usually 1-2 in. long, firmly membranous, sparingly pubescent or almost glabrous, or glandular-pubescent, uniformly green, the strong nerves parallel, the midrib prickly beneath; flowers white, long-pedicelled, forming very poor terminal or axillary corymbs, or often solitary and leaf-opposed; bracts and stipules linear-subulate; calyx from almost glabrous to hirsute-tomentose, the lobes subulate-acuminate; petals spreading; fruit elongate-ovoid, yellow, glabrous, much longer than the calyx.

HAB.—Not uncommon in the drier hill forests and hill toungyas of Martaban, at 3,000 to 4,000 ft. elevation; also Ava hills.—Fl. April.—1.

## ROSA, L.

Calyx-tube globose or ovoid, contracted in a 1 neck, the limb 5-lobed. Petals 5. Stamens nume several or many distinct carpels enclosed in the solitary suspended ovule in each, the styles

tube and sometimes united. Ripe carpels dry and hairy, sometimes surrounded with pulp and enclosed in the more or less succulent calyx-tube, forming a spurious berry.—Erect or climbing shrubs, rarely small trees, usually prickly armed, with unpaired-pinnate leaves. Stipules leafy, adherent to the petiole. Flowers showy, solitary or in small terminal corymbs or panicles.

\* *Styles united in a column. Flowers corymbose.*

Flowers small, pink; calyx glabrous or pubescent, the lobes short and entire; leaflets small, pubescent beneath; stipules pinnatifid.

*R. multiflora.*

Flowers large, white; calyx glandular-tomentose, of the lobes usually one or more lobed; leaflets glabrous; stipules entire.

*R. moschata.*

\* \* *Styles free.*

○ Calyx-throat not closed by the disk.

Flowers large, usually corymbose; calyx glabrous or sparingly glandular; leaflets glabrous, glaucous beneath; ovaries about 40-50

*R. Indica.*

As former, but flowers solitary; ovaries only about 15

*R. damascena.*

Flowers solitary; calyx-tube and the globose fruit densely echinate; leaflets small

*R. microphylla.*

○ ○ Calyx-throat completely closed by the disk.

Calyx and branchlets, and also the globose fruits, densely tomentose

*R. involucrata.*

Calyx and peduncles hispid; leaflets wrinkled, opaque

*R. rubiginosa.*

1. *R. involucrata*, Roxb.—A meagre straggling shrub, the branches more or less tomentose and armed with compressed, strong, straight prickles; stipules downy, the borders divided into several compound capillary segments, here and there fringed with glands; leaves unpaired-pinnate, the petiole and rachis tomentose and furnished with a few straight thin prickles; leaflets in 3-4 pairs with an odd one, elliptical or elliptically-oblong, blunt or acute, very shortly petioluled, chartaceous, toothed, about 1-1½ in. long, glabrous and somewhat glossy above, more or less tomentose beneath; flowers large, white, terminal, either solitary or usually by 3-5 together, on short densely tomentose pubescent pedicels and usually surrounded by 3 or 4 approximated leaves; calyx densely whitish tomentose, pubescent, the lobes lanceolate, entire and subulate-acuminate; bracts greyish tomentose, linear, the borders cut into several linear segments; petals notched, about an inch long; disk large and thickened, long; styles villous, a little exserted; fruits globular, thick, tomentose.

HAB.—Ava, in the savannahs of the Irrawaddi valley from Mandalay northwards.—Fl. Febr.-March.—1.—SS.—All.

Many other species of roses are found cultivated around khyouks of Burma, amongst which *Rosa damascena* and *R. Indica* (if really distinct from one another) are the more common. I have given above a conspectus of the species found cultivated, but it is not necessary to describe them here.

## PIRUS, L.

Calyx-tube urceolate or rarely turbinate, adnate to the carpels and produced beyond them, the lobes reflexed, persistent or deciduous. Petals 5, shortly clawed. Stamens numerous, the filaments free or united at the base. Ovary inferior, 2-5-celled, with 2 or rarely more ascending ovules in each cell, the styles distinct or united at the base. Fruit fleshy, crowned with the persistent calyx or the scar of the fallen limb, 2-5 celled, the cells usually distinct, with 1 or 2 or rarely more erect seeds in each, the endocarp cartilaginous or rarely crustaceous or bony and firmly adhering to the sarcocarp.—Trees or shrubs, with alternate, simple, or pinnate deciduous leaves. Stipules deciduous. Flowers usually in terminal cymes or corymbs, rarely solitary or clustered. Bracts subnate, deciduous.

\* Ovules more than 2 in each cell; flowers solitary or by pairs

*P. Indica.*

\* \* Ovules 2 in each cell. Flowers in corymbs or cymes.

Flowers (and fruit-) on slender 1-2 in. long pedicels . . . *P. Pashia.*

(Flowers and) fruits on very short thick peduncles . . . *P. granulosa.*

1. *P. Indica*, Coleb.—A small leaf-shedding tree, the young shoots white-woolly; leaves from oblong-lanceolate to oval-oblong and elliptical, on a slender  $\frac{1}{2}$ - $\frac{3}{4}$  in. long petiole, shortly acuminate, obsoletely and minutely crenate-toothed,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, coriaceous, while young white-woolly beneath, more or less glabrescent; flowers white, middling-sized, on 2-4 lin. long white-woolly pedicels, usually by 2-3 or solitary in the axils of the young leaves; calyx densely white-woolly, the tube about 3 lin. long, the lobes somewhat longer, lanceolate, or linear-lanceolate, acuminate; petals about  $\frac{1}{2}$  in. long; apples more or less ovoid or rarely somewhat pear-shaped or globose, yellow, smooth,  $1\frac{1}{2}$ -2 in. long, crowned by the persistent calyx-limb.

HAB.—Ava, Kakhyen hills, east of Bharno.—Fl. March-April; Fr. Sept.-Oct.

2. *P. Pashia*, Don. (*P. variolosa*, Wall.; Brand. For. Fl. 204).—A tree about 25 ft. high, shedding leaves in C.S., the young shoots covered with a loose fugaceous white-woolly tomentum; leaves oval-oblong and ovate, on a long slender petiole, acute, crenate-toothed, membranous, thin chartaceous, 2-3 (sometimes 4-5) in. long, glabrous, turning black in drying; flowers white, on  $1-1\frac{1}{2}$  in. long straight, slender, whitish woolly, glabrescent pedicels, forming a short peduncled or almost sessile corymb in the axils of the young leaves; apples as large as a bullet, globose, yellow, sprinkled with whitish pustules, on a  $1\frac{1}{2}$ -2 in. long straight peduncle, very acerb, when over-ripe turning sweet and black.

HAB.—Ava, Kakhyen hills.—Fl. March; Fr. Aug.

3. *P. granulosa*, Bert.—A tree (24—30+6—12+2—3), shedding leaves in C.S., all parts glabrous; leaves ovate to ovate-oblong, unequal at the acute base, on a glabrous petiole about an inch long, acuminate, 4-5 in. long, almost coriaceous, especially towards the apex serrate-toothed, entire or nearly so towards the base, glabrous, not blackening in drying; apples as large as a small bullet, globular, sprinkled with white pustules, turning purplish black in ripening, very shortly and strongly peduncled, in a small, poor, robust cyme at the end of the branchlets and in the axils of the upper leaves.

HAB.—Not unfrequent in the stunted drier hill forests of the Nattoung, Mariaban, at 7,000 ft. elevation.—Fr. March.—L.—SS.—Metam.

## ERIOBOTRYA, Ldl.

Calyx-tube bell-shaped or turbinate, adnate to the ovary or free towards the 5-lobed limb. Petals 5. Stamens up to 20, inserted in the throat of the calyx-tube; filaments subulate. Ovary inferior or free at the apex, 2-5- or rarely 1-celled, with 2 erect ovules in each cell; styles as many as cells, free or more or less united at the base. Drupe or berry ovoid, 1-5-celled, the septa membranous or chartaceous, sometimes obliterated, the cells 1- or 2-seeded. Seeds erect.—Evergreen trees or shrubs, with alternate, simple, coriaceous leaves. Stipules sometimes almost leafy. Flowers small or mid-dling-sized, in terminal corymbs or panicles.

× Leaves entire. Flowers in corymbs.

Calyx and inflorescence puberulous; berries the size of a pea . . . *E. integrifolia*.

Inflorescence glabrous; apple of the size of a bullet . . . *E. macrocarpa*.

× × Leaves coarsely crenate-serrate. Panicles rusty woolly-tomentose.

Leaves glabrous; calyx about a line long; berries not edible . . . *E. dubia*.

Leaves woolly tomentose beneath; calyx 3-4 lin. long; berries the size of a plum, edible . . . *E. Japonica*.

1. *E. integrifolia*, Kz. (*Photinia Notoniansz*, Wall.; Bedd. Sylv. Madr. t. 192).—An evergreen tree 30-40 ft. high, remaining stunted in higher regions, all parts glabrous; leaves oblong to cuneate-oblong, acute at the base, on an 1-1½ in. long thick petiole, acuminate to acute, entire or with a few inconspicuous teeth, very coriaceous, 4-5 in. long, glossy above, the nerves and veins impressed above and prominent and strong beneath; flowers small, white, on short thick puberulous pedicels, forming a large terminal puberulous corymb; calyx about ½ lin. long, glabrous or slightly puberulous, the teeth minute; styles 2; berries nearly globular, the size of a pea, glabrous, 2-celled and 2-seeded.

HAB.—Frequent in the stunted drier hill forests of the Nattoung hills, Mariaban, at 7,000 to 7,200 ft. elevation.—Fr. March.—L.—SS.—Metam.

2. *E. macrocarpa*, Kz.—An evergreen tree (30—40 + 10—15 + 2—3), all parts glabrous; bark blackish, rough; leaves from obovate to oblong-lanceolate, tapering in a short  $\frac{1}{2}$ – $\frac{2}{3}$  in. long strong petiole, shortly and bluntish acuminate, quite entire, 5–6 in. long, coriaceous, smooth and glossy; flowers unknown; fruiting peduncles very thick and simple, only 1–3 in. long, glabrous, in the axils of the upper leaves and at the end of the thick branchlets; fruit a more or less globose apple of the size of a bullet, glabrous, crowned with the calyx-limb.

HAB.—Rare in the tropical forests of the north-eastern slopes of the Kambala toun, Pegu Yomah, at about 2,000 to 3,000 ft. elevation.—Fr. March–Apr.—s.—SS.—SiS. (?)

3. *E. dubia*, Kz.—An evergreen tree (60—70 + (?) + 4—5), the young shoots rusty woolly-tomentose; leaves oblong and oblong-lanceolate to lanceolate, acute or acuminate at the base, on rather long (those of the uppermost leaves short and thickened) petioles, acuminate or acute, coarsely erenate-serrate, coriaceous, 7–9 in. long, glabrous, the nerves sharply prominent beneath; flowers rather small, on short thick pedicels supported by short very deciduous bracts and bractlets, disposed in a rusty-woolly-tomentose terminal panicle; calyx about a line long, rusty tomentose, the lobes nearly as long as the tube, acute; berries obovoid, 1–2-seeded, not edible.

HAB.—Frequent in the hill forests, especially the moister ones, of the Nat-toung hills, Martaban, at 6,000 to 7,000 ft. elevation; Chittagong; Ava, Kakhien hills.—Fl. March.—s.—SS.—Metam.

REMARKS.—Wood light-brown.

*N. B.*—*E. Japonica*, Ldl.,—the loquat—is found occasionally cultivated in gardens.

### SAXIFRAGEÆ.

Flowers usually hermaphrodite and regular. Calyx 5-rarely 4–12-merous, free or adnate to the calyx, the lobes valvate or imbricate. Petals usually 4 or 5, rarely none, perigynous rarely epior hypo-gynous, imbricate or valvate. Stamens as many or twice as many as petals, rarely indefinite; filaments free; anthers usually didymous. Intrastaminal disk often present and sometimes passing into staminodes or glands. Ovary more or less adnate to the calyx, or if free usually attached to a broad base, either 2- to 5-celled or with 2 to 5 parietal placentas, very rarely contracted at the base or apocarpous, with several or very rarely a solitary ovule in each cell or to each placenta; styles as many as ovary-cells, free or rarely united. Fruit a capsule or rarely berry-like and indehiscent. Seeds usually small, with or rarely without albumen. Embryo straight, small or rarely rather large.—Herbs, rarely

trees, with alternate or opposite, simple or compound leaves. Stipules present or not.

### POLYOSMA, Bl.

Calyx-tube ovoid, adnate to the ovary, the limb 4-toothed. Petals 4, valvate, strap-shaped, often cohering in a tube, deciduous. Stamens 4; anthers linear, erect. Ovary inferior, 1-celled, the numerous ovules attached to the 2 parietal placentas which protrude far into the cell and almost divide it into two; style filiform; stigma terminal, entire. Berry inferior, 1-seeded. Seed erect, large, the testa rather thick. Embryo small, at the apex of a fleshy albumen.—Trees, with simple leaves opposite or nearly so. Flowers in simple terminal racemes or spikes.

1. *P. Wallichii*, Benn.—An evergreen small tree, about 25-30 ft. high, the young shoots tawny pubescent; leaves obovate-lanceolate to oblanceolate-oblong, acute at the base, on a slender petiole  $\frac{1}{2}$ -1 in. long, shortly and rather abruptly acuminate, remotely and slightly serrate while young, afterwards thickened-toothed by the excurrent nerves, 3-5 in long, chartaceous, slightly pubescent on the nerves beneath; flowers  $\frac{1}{2}$  in. long, on greyish puberulous 1-bracted peduncles not above a line long, forming slender pubescent terminal racemes; calyx-teeth ovate, acute; corolla puberulous.

HAB.—Tropical forests of the Andamans.—Fl. R.S.

REMARKS.—Wood rather light, pale-brown, pretty straight-fibrose, rather close-grained, soft.

### HAMAMELIDEÆ.

Flowers regular or irregular, hermaphrodite or unisexual. Perianth in male flowers sometimes wanting. Calyx-tube more or less adnate to the ovary, the limb truncate or 4-5-lobed, valvate or imbricate. Petals as many, more or fewer than calyx-lobes, or none. Stamens 4 or more, definite or indefinite, perigynous, 1-seriate; filaments free; anthers 2-celled, the cells opening laterally in various ways. Ovary inferior or half-inferior, rarely superior, consisting usually of 2 or rarely more carpels, usually free at the apex and beaked, with 2 suspended ovules in each carpel or rarely more on axile placentas; style usually persistent. Fruit a capsule, the carpels usually diverging at the apex, and each one opening in 2 short valves. Albumen thin, fleshy.—Trees or shrubs, with usually alternate, simple or 3-lobed leaves. Stipules deciduous or persistent. Flowers small, usually collected in heads, rarely racemose or spicate.

A small order, of which only 2 species are found in Burma, but no doubt others will be discovered in the Ava hills. *Storax*, a

fragrant resin, is the yield of several species of *Liquidambar* and *Altingia*. The bark of some is astringent.

Petals in hermaphrodite flowers linear; leaves persistent	.	.	<i>Bucklandia</i> .
Petals none; leaves deciduous, glandular-serrate	.	.	<i>Altingia</i> .

## BUCKLANDIA, R. Br.

Flowers polygamous, in heads, the calyces confluent. Calyx-tube almost bell-shaped, adhering to the ovary, the limb repand-5-lobed. Petals in hermaphrodite flowers linear-spatulate, often transformed into stamens, in females reduced to 4 in number and rudimentary. Stamens 10 to 14 (in females none), the filaments unequal, subulate; anthers unequally 2-valved, the connective apiculate. Ovary semi-inferior, 2-cleft at the summit, 2-celled, with 6 ovules in each cell arranged in 2 rows; styles 2, recurved, thick. Capsule nearly free, woody, 2-valved and 2-celled, the valves 2-cleft, the cells up to 6-seeded. Seeds partially without embryo, the fertile ones winged upwards. Albumen thin, fleshy.—Trees, with alternate, simple or 3-lobed leaves. Stipules large, coriaceous, deciduous. Flower-heads in peduncled corymbs, 10-20-flowered.

1. *B. populnea*, R. Br.—An evergreen tree (60—80+18—40+5—6), remaining stunted in higher regions, the very young shoots fugaceously rusty pubescent; leaves broadly ovate to nearly cordate, truncate at the base, on a 1-2 in. long thick petiole, acuminate, entire, simple or (on the younger branches) cuspidately 3-lobed, very coriaceous, glossy above, glabrous; stipules large, oblong, blunt, somewhat pruinous; flower-heads small, greenish, compact, on thick pretty long peduncles covered with a rusty or rather copper-coloured pubescence, forming sessile or almost sessile corymbs in the axils of the leaves; capsules as large as a pea, almost globular seated on the cup-shaped calyces united in a solid head.

HAB.—Frequent in the hill forests, especially the damp ones, of the Martaban hills, at 4,000 to 7,200 ft. elevation.—Fl. March.—s.—SS.—Metam.

REMARKS.—Wood red-brown, rather heavy, fibrous, but close-grained, rather hard, apparently soon attacked by xylophages.

## ALTINGIA, Noronh.

Flowers unisexual, in heads supported by a single bract. Males: calyx and corolla none. Stamens packed into a globular head, the filaments short; anthers 4-cornered. Females: calyces confluent, without limb; petals none. Anthers rudimentary. Ovary half-inferior, 2-celled, with many ovules attached to the axile placenta of each cell, the carpels produced into subulate recurved caducous styles. Capsules opening at the summit in 2 valves, firmly cohering and forming an indurated globular many-capsuled head. Seeds

all but one sterile, the fertile lowermost one winged-angular. Albumen scanty.—Large trees, with alternate simple glandular-serrate deciduous leaves. Stipules very deciduous or persistent. Flower-heads small, the male ones racemose, the female ones solitary.

1. *A. excelsa*, Noronh.—*Nan-ta-yop*.—A leaf-shedding tree (150—180+80—100+15—20), all parts quite glabrous; leaves oblong to ovate-oblong, on a slender glabrous petiole, rounded at the base, acuminate, glandular-serrate, chartaceous, glabrous, conspicuously nerved, 4-5 in. long; male flower-heads almost sessile, each supported by a rather large, solitary, broad, silky-pubescent bract, forming a sort of catkin; female flower-heads long-peduncled, solitary, axillary; capsule almost immersed in the confluent calyces and forming a globular velvety-tomentose areolate rather woody fruit.

HAB.—Tenasserim, locally quite abundant; Ava, Khakyen hills.—Fr. March.—s: l.—SS.—Metam.

REMARKS.—Wood brown, very hard, close-grained, oily, of a somewhat balsamic odour. Yields a kind of storax (*Kandei Sund*). Dr. Mason states that a considerable stream in the province of Mergui derives its name from this tree, in consequence of its growing so thickly on its banks.

### RHIZOPHOREÆ.

Calyx-tube usually adnate to the ovary, sometimes produced beyond it, rarely quite free, the limb 4-14-lobed, valvate. Petals as many as calyx-lobes and alternating with them, the margins usually induplicate and embracing the stamens. Stamens as many or twice as many as petals or more, inserted with them at the base of the free part or lobes of calyx; anthers erect or versatile, 2-celled, opening longitudinally. Ovary more or less inferior or rarely quite superior, 2- or more-celled, with 2 or few pendulous ovules in each cell, or rarely 1-celled by obliteration of the partition; style simple, with an entire or lobed stigma. Fruit inferior or enclosed in the calyx. Seeds solitary or few, with or without albumen.—Trees or shrubs, with opposite, simple, usually glossy leaves. Flowers axillary, solitary, clustered or in cymes.

The *rhizophors* form an important agency in binding the muddy shores of tropical countries, especially along estuaries. The bark, etc., of many is astringent and good for tanning purposes; it is also often used for dyeing black. The timber of *Bruguiera* and others is hard and durable.

\* *Ovary inferior.*

× Seeds without albumen, germinating while still on the tree, the radicle enlarging rapidly and protruding to a great length from the summit of the capsule.  
Saline trees or shrubs.

- Calyx 4-cleft; petals entire; ovary 2-celled, with 2 ovules in each cell . . . *Rhizophora*.  
 Calyx 5-6-cleft; petals notched and appendaged; ovary 3-celled, with 2 ovules in each cell . . . *Ceriops*.  
 Calyx 5-6-cleft; petals shagged; filaments capillary; ovary 1-celled with 6 ovules . . . *Kandelia*.  
 Calyx 8-14-cleft; petals 2-cleft, appendaged; filaments filiform; ovary 2-4-celled, with a solitary ovule in each cell . . . *Bruguiera*.  
 X X Embryo immersed in a fleshy albumen. Seeds not germinating before their fall.  
 Calyx bell-shaped beyond the ovary; ovary-cells 2-ovuled; flowers in cymes . . . *Carallia*.  
 \* \* Ovary superior or nearly so, with a broad base adnate to the calyx.  
 Calyx without bractlets; ovary-cells 4-ovuled . . . *Gynotroches*.

## RHIZOPHORA, L.

Calyx subtended by bractlets united in a cup, 4-parted, valvate. Petals 4, inserted to the base of the fleshy disk, entire. Stamens 8-12; filaments short. Ovary half-inferior, 2-celled, produced in a fleshy cone; style subulate with a 2-toothed stigma; cells with 2 suspended ovules. Fruit coriaceous, surrounded with the calyx-lobes, 1-celled and 1-seeded. Seed pendulous with an elongate radicle protruding from the apex of the capsule while still on the tree. Cotyledons conferruminate. Albumen none.—Saline trees, with very glossy leathery leaves.

Flowers pedicelled; petals along the margins villous . . . *R. mucronata*.  
 Flowers sessile; petals glabrous . . . *R. conjugata*.

1. *R. mucronata*, Lamk.; Bedd. Sylv. Madr. 99, t. 13, f. 4; Brand. For. Fl. 217.—*Pyoo*.—An evergreen tree (15—25 + (?) + 1—1½), all parts glabrous; leaves oval to elliptically oblong, mucronate by the excurrent midrib, 3-7 in. long, narrowed at the base, rather long-petioled, blunt, coriaceous, very glossy, glabrous; flowers rather large, yellowish, pedicelled, in 2-3-cleft axillary peduncled cymes; petals villous along their inflexed margins; stamens 8; fruit large, about an inch in diameter.

HAB.—Frequent in the tidal, especially the mangrove, forests from Arracan and Pegu down to Tenasserim.—I.—SS.—Sal.

REMARKS.—Wood greyish, close-grained, rather heavy. Bark good for tanning.

2. *R. conjugata*, L.; Bedd. Sylv. Madr. 99.—*Pyoo*.—An evergreen tree (15—25+6—10 + 1—1½), all parts glabrous; leaves oblong to oblong and elliptically-lanceolate, narrowed and usually more acute at the base, convolutely mucronate, 4-8 in. long, rather shortly petioled, coriaceous, very glabrous, glossy; flowers large, by 2-3 sessile on a short thick simple axillary peduncle; petals flat, glabrous; stamens 8-12, usually 11; fruit about ½ an in. thick.

HAB.—Frequent in the littoral, especially the mangrove, forests from Arracan and Pegu down to Tenasserim and the Andamans.—I.—SS.=Sal.

## CERIOPS, Arn.

Calyx subtended by bractlets united in a cup, the tube short and at the base adnate to the ovary, the limb 5-6 parted, valvate. Petals 5-6, inserted to the base of the 10-12-lobed fleshy disk, notched, the lobes clavate-bristly. Stamens 10-12, by pairs opposite the petals, the filaments slender. Ovary half-inferior, 3-celled, with 2 pendulous ovules in each cell, produced in a fleshy cone; style short with a simple stigma. Fruit coriaceous, surrounded by the reflexed calyx-lobes, 1-celled and 1-seeded. Seed pendulous, germinating and protruding its elongate-clavate radicle from the top of the fruit while still on the tree; cotyledons conferruminate.—Little, usually pygmæan, trees or rather simple-stemmed shrubs with lucid coriaceous leaves. Flowers small, cymose.

Flowers in very short-peduncled compact cymes; petals setose, ciliate towards the apex

Flowers in rather loose cymes; petals terminated by 2 or 3 club-shaped appendages

*C. Roxburghiana.*

*C. Candolleana.*

1. *C. Roxburghiana*, Arn.—*Ka-pyaing*.—An evergreen pygmæan tree or rather simple-stemmed shrub, 2 to 4 ft. high, all parts quite glabrous; leaves obovate or oboval, acute at base, rather long petioled, blunt, coriaceous, glabrous, glossy above; flowers small, greenish, sessile or nearly so, forming a dense capitate cyme on a very short and thick peduncle; petals whitish, concave, setose-ciliate towards the apex; stamens 10-12; fruits small, club-shaped.

HAB.—Frequent in the littoral forests all along the coast from Chittagong down to Tenasserim.—I.—SS.=Sal.

2. *C. Candolleana*, Arn.; Bedd. Sylv. Madr. t. 13, f. 5; Brand. For. Fl. 218.—An evergreen dwarf tree or simple-stemmed shrub, 2 to 5 ft. high, all parts quite glabrous; leaves obovate-oblong, narrowed at the base, blunt or sometimes notched, rather long-petioled, glabrous, glossy above; flowers small, very shortly pedicelled in short but loose cymes; petals obovate with flat margins, somewhat roughish on the outside, terminated by 2 or 3 club-shaped appendages; stamens nearly as long as the petals, glabrous; fruits small, club-shaped.

HAB.—In the mangrove swamps along the shores of the Andamans.—I.—SS.=Sal.

## KANDELIA, WA.

Calyx subtended by bractlets united in a cup, the tube short, the limb 5-6-parted, valvate. Petals 5-6, inserted to the base of

the fleshy disk, 2-cleft, the lobes capillary multifid. Stamens numerous, the filaments capillary. Ovary half-inferior, produced in a fleshy cone, 1-celled, with 6 ovules attached by pairs to the middle of the axis; style filiform, with a 3-cleft stigma. Fruit coriaceous, surrounded by the reflexed calyx-lobes, 1-celled and 1-seeded. Seed pendulous, germinating and protruding its elongate-clavate radicle from the apex of the fruit while still on the tree; cotyledons conferruminate.—Little trees or rather shrubs, with coriaceous lucid leaves. Flowers rather large, white.

1. *K. Rheedei*, WA.; Bedd. Sylv. Madr. 100, t. 13, f. 6.—An evergreen little tree or rather simple-stemmed shrub, 3 to 5 ft. high, all parts glabrous; leaves oblong to elliptically oblong, narrowed at the base, blunt, rather shortly petioled, coriaceous, glossy above; flowers rather large, whitish, in poor long-peduncled axillary cymes; fruit conically-ovoid, about an inch long.

HAB.—Frequent in the tidal forests all along the coasts from Chittagong to Pegu.—Fl. May; Fr. June.—I.—SS.—Sal.

### BRUGUIERA, Lamk.

Calyx without bractlets, the tube obversely conical or bell-shaped, the limb 8-14-parted, valvate. Petals 8-14, inserted on the margin of the calyx, 2-cleft, bearing 1 or more bristles on the back, at the base convolute and embracing the stamens. Stamens 16-28, by pairs opposite the petals; filaments filiform. Ovary inferior, 2-4-celled, with 2 ovules in each cell; style filiform with a 2-4-cleft stigma. Fruit thick-coriaceous, crowned by the erect or reflexed calyx-lobes, 1-celled and one-seeded. Seed pendulous, germinating and protruding its elongate-clavate radicle from the apex of the fruit while still on the tree; cotyledons short, blunt.—Trees, with glossy coriaceous leaves. Flowers rather large, with a green or purplish calyx.

\* *Flowers small; calyx-tube almost club-shaped; the limb 8-cleft; petals 8.*

Calyx-tube tapering at the base, ribbed, the lobes very short and rigid.

Calyx-tube obtuse at the base, not ribbed, the lobes nearly as long as the tube . . . *B. parviflora.*

\* \* *Flowers rather large; calyx-tube almost bell-shaped; the limb 8-14-parted; petals 8-14* . . . *B. caryophylloides.*

\* \* *Flowers rather large; calyx-tube almost bell-shaped; the limb 8-14-parted; petals 8-14* . . . *B. gymnorhiza.*

1. *B. parviflora*, WA.; Bedd. Sylv. Madr. 101.—An evergreen small tree or shrub, all parts quite glabrous; leaves oblong to elliptically lanceolate, narrowed at the base, blunt, rather long-petioled, coriaceous, glossy above; flowers small, yellowish green, on slender pedicels, by 3 or more, forming an axillary peduncled cyme of the length of, or longer than, the petioles; calyx-tube

ribbed, the lobes much shorter, rigid; petals shorter than the calyx-lobes, obovate, cucullate-2-lobed, with a bristle between, and 3 or 4 others at the apex of, the lobes, yellowish, puberulous outside; stamens alternately shorter; fruits cylindrically club-shaped, ribbed, crowned with the stiff short calyx-lobes.

HAB.—In the littoral, especially the mangrove, forests of Tenasserim and the Andamans.—1.—SS.=Sal.

2. *B. caryophylloides*, Bl.; Bedd. Sylv. Madr. 101.—An evergreen small tree, all parts quite glabrous; leaves oblong to oblong-lanceolate, narrowed at the base, acute, on a long and slender petiole, coriaceous; flowers small, more or less nodding, on very short and thick pedicels, solitary or by 2-5, forming a short cyme usually of the length of the petiole or shorter; calyx-tube not ribbed, turbinate-club-shaped, rounded at the base, the lobes somewhat shorter than the tube and spreading; petals erect, shorter than the calyx-lobes, oblong, whitish, somewhat puberulous outside, 2-cleft, with a rather long bristle between, and 3 to 5 twisted bristles at the apex of, the lobes; fruits pendulous, somewhat narrowed under the reflexed persistent calyx-lobes, not ribbed.

HAB.—In the mangrove swamps of Upper Tenasserim.—Fl. Feb.; Fr. Apr.—1.—SS.=Sal.

3. *B. gymnorhiza*, Lamk.; Brand. For. Fl. 219; Bedd. Fl. Sylv. Madr. 100 (*Brug. Rheedei*, Bl.; Bedd. Sylv. Madr. 100, t. 14, f. 1).—An evergreen tree (60—80 + 30—40 + 5—8), all parts quite glabrous; leaves oblong to elliptically lanceolate, 3-5 in. long, on a long and thick petiole, shortly and sharply acuminate, coriaceous and glossy; flowers middling-sized, about an inch long, jointed on a short, thick, nodding peduncle, solitary in the axils of the leaves; calyx-limb deeply 10-14-parted, the segments 6-8 lin. long, stiff-linear with 3-angular sharp points, the tube obsoletely 8-14-angular; petals 2-cleft with a bristle between the lobes, either quite glabrous or villous-silky along the margins, the lobes terminated by 1-3 bristles or naked; fruits drooping, oblong, crowned with the stiff calyx-lobes.

HAB.—Common in the littoral, especially the mangrove, forests, especially at estuaries, all along the coasts from Chittagong down to Tenasserim and the Andamans.—Fl. Jan.-May.—1.—SS.=Sal.

REMARKS.—Wood reddish brown, the sap-wood lighter coloured, close-grained, coarse-fibrous, very heavy, hard, strong and durable. Bark good for tanning purposes.

### CARALLIA, Roxb.

Calyx minutely bracted at the base, shortly 5-8-lobed, valvate. Petals 5-8, inserted round the thin 10-16-lobed disk. Stamens

usually twice as many as petals; filaments short. Ovary inferior, 1- or nearly 3-5-celled, with 2 pendulous ovules in each cell. Fruit small, coriaceous, usually 1-celled and 1-seeded. Seeds reniform-globose. Albumen fleshy.—Trees or shrubs, with glossy, entire, or serrulate leaves. Flowers small, cymose.

Leaves usually entire; petals not embracing the filaments . . . *C. lucida*.

Leaves serrulate; petals embracing the filaments . . . *C. lanceæfolia*.

1. *C. lucida*, Roxb. (*C. integerrima*, DC.; Bedd. Sylv. Madr., t. 193; Brand. For. Fl. 219).—*Manec-aw-ka*.—An evergreen tree (50—80 + 25—50 + 4—10), all parts glabrous; bark about 2 lin. thick, brittle, rough, dark-grey or blackish; cut brown; leaves elliptical or elliptically oblong, acute at the base, on a strong petiole  $\frac{1}{4}$ — $\frac{1}{2}$  in. long, apiculate or slightly acuminate, entire, coriaceous, 2-6 in. long, glabrous and glossy; flowers white, very small, sessile, in loose or compact short-peduncled axillary cymes; calyx shortly and broadly bell-shaped; petals obovate, concave, coarsely toothed, not embracing the stamens; stamens alternately shorter, the shorter ones opposed to the sepals and bent inwards; style long; berries the size of a pepper-kernel, globose, usually 1-seeded, crowned by the short connivent calyx-teeth.

HAB.—Frequent in the tropical and moister upper mixed forests, entering also the low forests, of Pegu and Martaban, up to 4,000 ft. elevation.—Fl. Dec.-Feb.; Fr. H.S.—sxl.—SS.—Metam. SiS. Lat. p.

REMARKS.—Wood red-brown, variegated, heavy and close-grained.—□ = 60 pd. Used for rice-pounders, planks, etc.; also good for furniture.

2. *C. lanceæfolia*, Roxb.—An evergreen tree, all parts glabrous; leaves elliptical to oblong, regularly crenulate-serrate, almost acuminate, thin coriaceous, shortly petioled; flowers small, white, crowded, almost sessile, in axillary short-peduncled rather lax cymes; petals reniform, truncate at the base and clawed, the blade crenulate and embracing the long inwards-curved filaments; style rather short; berries the size of a pepper-kernel, turbinate-globose, 2-3-seeded.

HAB.—In the tropical forests of Upper Tenasserim.—Fr. H.S.

## GYNOTROCHES, Bl.

Calyx without bractlets, the limb 4-5-parted. Petals 4-5, clawed, fimbriate-lacrate. Stamens 8 or 10, inserted under the margins of the 8-10-crenate disk; filaments filiform; anthers didymous. Ovary superior, with a broad base adhering to the calyx, 3-6-celled, with 4 ascending ovules in each cell; style columnar with a 3-6-lobed stigma, the lobes notched and recurved. Berry fleshy, 3-6-celled, many-seeded. Seeds small. Albumen copious.—Little trees, with glossy leaves and deciduous stipules. Flowers small, in axillary clusters or fascicles.

1. *G. axillaris*, Bl.—An evergreen small tree or shrub, all parts glabrous; leaves oblong to elliptical, acuminate, 2-5 in. long, coriaceous, glossy, strongly net-veined; flowers small, yellowish green, pedicelled, almost dioecious by abortion, crowded in the axils of the leaves; calyx about a line long, glabrous; the males with perfect stamens and petals, the ovary usually thin and abortive with the stigma not dilated; the female-hermaphrodites longer pedicelled, the petals and stamens usually smaller or the latter sometimes barren; stigma radiately lobed; berry  $1\frac{1}{2}$ -2 lin. thick, several-seeded, almost globular.

HAB. — Upper Tenasserim.

### COMBRETACEÆ.

Flowers hermaphrodite, rarely polygamously dioecious or unisexual. Calyx-tube terete or angular, more or less narrowed above the ovary, the limb usually bell-shaped, 4-5- rarely more-toothed, -lobed or -parted, valvate or very rarely imbricate, persistent or deciduous. Petals none, or as many as calyx-lobes, usually small, imbricate or valvate. Stamens as many or twice as many as calyx-lobes, rarely numerous, in a single or 3 series, inserted on the calyx or epigynous; filaments straight or inflexed in bud, sometimes alternating with glands or staminodes; anthers versatile and opening longitudinally, or adnate and opening in 2 valves. Epigynous disk none or lobed. Ovary inferior, 1-celled, with 2 or more, or very rarely a single, pendulous ovule; style filiform or scarcely any, with an entire terminal stigma. Fruit various, dry or drupaceous, indehiscent or very rarely dehiscent, winged or not. Seed solitary, pendulous. Albumen none; cotyledons convolute or folded, very rarely flat; radicle short, superior.—Trees or shrubs, often climbing, with alternate or opposite, rarely whorled, simple or rarely 3-foliolate leaves. Stipules none. Flowers usually small, in axillary or terminal inflorescences. Bracts usually small; bractlets sometimes larger, often wanting.

Astringent properties prevail in the order, and hence the bark of several species is used for tanning purposes and the fruits for dyeing black. Some of the trees, like *Terminalia*, yield valuable timber, while the kernels of *Terminalia catappa* are eaten like almonds. All the Burmese species are woody, and, therefore, find a place here.

\* Stamens usually without glands or staminodes at base; anthers opening by longitudinal slits. Ovules 2 or more. Flowers in racemes, spikes or heads.

○ Calyx-limb deciduous.

× Calyx-tube short, more or less constricted but not produced beyond the ovary.

- No petals; stamens inflexed in bud; erect trees; flowers in spikes . . . *Terminalia*.
- Petals very rarely wanting; stamens straight in bud; usually climbers; flowers usually in racemes . . . *Combretum*.
- × × Calyx-tube long-produced beyond the ovary.
- Calyx-tube 2-winged at base; stamens 10, exserted; leaves alternate; flowers in dense heads; trees . . . *Anogeissus*.
- Calyx-tube 6-cornered, very long-produced beyond the ovary; the limb small; stamens straight; leaves opposite; flowers in racemes; scandent shrubs . . . *Quisqualis*.
- ○ Calyx-limb persistent.
- Calyx-tube 5-ribbed, not produced beyond the ovary, the limb enlarging after flowering; stamens 10, enclosed; leaves opposite; climbers, with racemose flowers . . . *Calycopterus*.
- Calyx-tube elongated, narrowed above the ovary, the limb not enlarging; stamens 5 or 10, exserted; leaves alternate; flowers in racemes; erect trees . . . *Lumnitzera*.
- \* \* Stamens alternating with as many glands or staminodes; anthers opening by a slit along the inner edge or in 2 valves. Ovules solitary. Flowers in cymes.
- Calyx-lobes valvate, deciduous; fruit laterally 2- or 4-winged; climbers with 3-foliate leaves . . . *Illigera*.
- Calyx-lobes imbricate, 2 of them persistent and enlarging into long terminal wings; erect tree with simple or lobed leaves . . . *Gyrocarpus*.

## TERMINALIA, L.

Flowers hermaphrodite or polygamously dioecious. Calyx-tube not produced beyond the ovary, the limb bell-shaped or urceolate, 5-cleft, deciduous. Petals none. Stamens in 2 series; filaments filiform or subulate, inflexed in bud; anthers didymous. Ovary 1-celled, with 2 or rarely 3 suspended ovules; style subulate with a simple stigma. Fruit angular, compressed or winged, sometimes samaroid, dry or fleshy, the putamen coriaceous or bony. Seed pendulous, the testa membranous. Cotyledons convolute.—Trees or erect shrubs, with alternate or rarely opposite or whorled leaves often glandular at the base. Flowers small, usually offensively smelling, in axillary spikes.

\* *Fruit a fleshy drupe, with a long compressed or obsoletely angular putamen.*

- Young shoots rusty pubescent; leaves cuneate obovate, very shortly petioled; spikes all simple, glabrous; drupes compressed . . . *T. catappa*.
- As former, but drupes obsoletely 5-angular, red within . . . *T. procera*.
- Buds rusty villous; leaves obovate, on 2-3 in. long petioles; spikes all simple, puberulous; drupes obovate, usually silky pubescent . . . *T. Belerica*.
- Young shoots and under-side of the short-petioled oblong leaves rusty villous; spikes simple or panicle, tomentose or puberulous; drupes oval, glabrous; calyx-tube villous . . . *T. chebula*.
- As former, but calyx-tube quite glabrous, the flowers and fruits much smaller . . . *T. tomentella*.
- Very young shoots rusty-villous; leaves quite glabrous, shortly petioled, acuminate; spikes tomentose or puberulous, collected in terminal panicles; drupes oblong-lanceolate, obsoletely 5-cornered . . . *T. citrina*.

\* \* *Fruit a dry nut with a chartaceous or fibrous-coriaceous pericarp, samaroid or 3-5-cornered with as many or fewer equal or unequal wings.*

× Nuts usually 3-cornered, the angles extended into 2 equal, or 1 or 3 unequal wings.

○ Spikes simple, axillary.

All parts glabrous; leaves obovate; petiole 2-3 in. long; nut 2-winged, about 3-3½ in. across, brown-velvety . . . . . *T. bialata*.

As former, but leaves smaller and shorter petioled; nuts 2-winged, only ½-¾ in. across . . . . . *T. pyrifolia*.

○ ○ Spikes collected in a terminal panicle.

Young shoots and inflorescence tawny pubescent; nuts almost glabrous, equally 2-winged, only about 4-5 lin. broad . . . . . *T. myriocarpa*.

× × Nuts 4- or 5- cornered, all angles equally produced into wings.

All parts more or less grayish tomentose; leaves shortly petioled, with 2 stalked turbinate basilar glands, strongly net-veined beneath . . . . . *T. alata*.

All parts glabrous; leaves shortly petioled, with 2 stalked turbinate glands, prominently net-veined beneath; the panicle spikes and the calyces pubescent or almost tomentose . . . . . *T. crenulata*.

As former, but the panicle spikes and calyces outside quite glabrous . . . . . *T. macrocarpa*.

\* *Fruit a fleshy drupe, with a compressed or slightly angular putamen.*

1. *T. catappa*, L.; Bedd. Sylv. Madr. t. 20.—A tree (60—70 + 30—35 + 6—8), shedding leaves in H.S., the branches whorled and spreading, the young shoots brown-pubescent; bark smooth; leaves crowded at the end of the branchlets, on a very short thick petiole, from obovate to obovate-oblong, rounded or tapering at the cuneate base and furnished with a gland on each side, apiculate, ½-1 ft. long, chartaceous, glabrous; flowers small, whitish, subtended by a small lanceolate bractlet, the males numerous, with a few hermaphrodites towards the base, forming solitary, simple, and rather slender glabrous spikes in the axils of the leaves and shorter than them; calyx glabrous, the tube in the hermaphrodite flowers rather elongate and contracted above the ovary, villous inside, the lobes glabrous; drupes oblong to oval, somewhat compressed, smooth, yellowish, about 1-1½ in. long.

VAR. 1. *Catappa*, leaves rounded at the base; stamens all spreading; drupes larger, slightly compressed, with somewhat prominent edges, the mesocarp whitish or yellowish.

VAR. 2. *pubescens*, leaves more or less pubescent beneath.

HAB.—Frequent in the beach forests of the Andamans; much cultivated in villages all over Burma.—Fl. Apr.-May; Fr. June-July—sxl. SS.—Sis.

REMARKS.—Wood brown, waved, rather heavy, rather close-grained; takes a fine polish.

2. *T. procera*, Roxb.—A lofty tree (80—120 + 50—90 + 7—10) apparently shedding leaves in H.S., the leaf-buds appressed

pubescent; leaves obversely lanceolate to obovate-oblong, usually unequal at the acute base, on a rather slender petiole  $\frac{1}{3}$ - $\frac{3}{4}$  in. long, 5-8 in. long, coriaceous, glabrous, acute or apiculate; flowers small, white, almost sessile, forming glabrous axillary racemes, the hermaphrodite ones situated near the base; calyx-limb salver-shaped; petals ovate-lanceolate, acute; stamens alternately shorter and incurved; drupes ellipsoid-oblong, obsoletely 5-angled, glabrous, about an inch long or somewhat longer, yellow, the mesocarp pulpy, red, somewhat acid, the nut conform with the drupe, 5-angular and not in the least compressed.

HAB.—Not unfrequent in the tropical forests of the Andamans.—Fr. R.S.

3. *T. Belerica*, Roxb.; Bedd. Sylv. Mad. t. 19; Brand. For. Fl. 222.—*Thitsein*.—A leaf-shedding tree (70—80 + 30—40 + 6—8), all parts glabrous, the leaf-buds rusty pubescent; bark thick, brittle, longitudinally fissured and cracked, blackish; cut yellow; leaves crowded at the end of the branchlets, obovate to obovate-oblong, on a glandless or 2-glandular slender petiole 2-3 in. long, often somewhat unequal at the base, apiculate, entire, membranous, 5-7 in. long, glabrous; flowers small, dull greyish yellow, sessile, in axillary, solitary, simple, puberulous spikes, the males towards the apex of the spike, the females below; calyx shortly rusty pubescent outside, densely rusty villous at the base inside, the tube oblong, pubescent; drupes obovate, nearly as large as a plum, corky-fleshy, usually silky puberulous.

HAB.—Frequent in the mixed forests, especially the upper ones, all over Pegu down to Upper Tenasserim, rather rare in Prome and Ava, up to 2,000 ft. elevation.—Fl. Apr.-May; Fr. C.S.—L.—SS.—Metam. S.S.

REMARKS.—Wood rather soft, white, tolerably durable. □' = 40 pd. Good for packing-boxes. Exudes a gum.

4. *T. tomentella*, Kz.—*Hpangah*.—A tree (80—100 + 50—80 + 9—12), shedding leaves in H.S., the young parts all covered with a copper-coloured appressed villous pubescence; bark dark or blackish grey, longitudinally deeply cracked, peeling off in thick brittle pieces; leaves ovate to ovate-oblong, unequally decurrent at the base, on a 8-12 lin. long petiole 2-glandular towards the apex, 5-8 in. long, acute or nearly so, coriaceous, entire, while young densely, afterwards slightly, coppery-pubescent beneath or altogether glabrescent; flowers small, sessile, yellowish, in spikes, forming shortly tomentose, rusty or tawny coloured small panicles; bractlets subulate, longer than the flowers, deciduous; calyx quite glabrous outside, the lobes triangular, acute, along with the hypogynous glands densely white-woolly inside, the tube ovate, terete, glabrous; drupes hardly an inch long, oval, obsoletely 5-angled or terete, greenish yellow, smooth.

**HAB.**—Common in the upper mixed forests and low forests all over Pegu and Martaban down to Tenasserim, up to 2,000 ft. elevation.—Fl. June; Fr. C.S.—l.—SS.=Metam. SiS. Arg.

**REMARKS.**—Wood pale-brown, rather heavy, close-grained, the heart-wood yellowish brown. Used for yokes and canoes. Fruit mixed with iron-clay gives an ink of an inferior kind.

5. *T. chebula*, Retz.; Bedd. Sylv. Madr. t. 27.; Brand. For. Fl. 223, t. 20.—A tree (60—70+25—35+8—10), shedding leaves in H.S., the younger parts rusty villous; leaves opposite or nearly so, oblong, on a  $1\frac{1}{2}$ -2 in. long petiole usually 2-glanded below the apex, shortly and bluntish acuminate or apiculate, with or without 2 small glands on the margin near the base, entire, almost coriaceous, 6-8 in. long, while young covered with a dense rusty-coloured tomentum, when full-grown glabrous above, or altogether glabrescent; flowers small, dull-white, all hermaphrodite, subtended by a subulate downy bractlet; calyx very villous all over, especially inside, the tube oval or oblong-oval, angular; hypogynous glands 5, very villous; drupes oval, about  $1-1\frac{1}{2}$  in. long, obsoletely 5-angular, smooth, greenish yellow, the mesocarp hard, yellowish.

**HAB.**—Chittagong.

**REMARKS.**—Sap-wood greyish, streaked, tolerably close-grained; the heart-wood hard, yellowish or dark-brown to blackish, heavy; takes a fine polish. Good for furniture. Nuts used with iron-clay for a good sort of ink; they also give with alum a durable yellow dye.

6. *T. citrina*, Roxb.—A tree (60—80+15—30+5—8), shedding leaves in H.S., all parts glabrous, the very young shoots rusty villous; leaves almost opposite, from broadly lanceolate to oblong, on a  $\frac{1}{2}$ -1 in. long petiole 2-glanded at the apex, usually with a few glands along the margin towards the base, shortly acuminate, entire, chartaceous, when very young rusty villous, soon quite glabrous, and, in a dried state, of a peculiar metallic or silky lustre, 4-6 in. long; flowers small, dull-yellow, sessile, all hermaphrodite, subtended by a deciduous linear bractlet, forming spikes collected in a terminal slightly rusty villous or puberulous panicle; calyx glabrous outside, pubescent inside, the tube linear-oblong; hypogynous glands 5, rusty-woolly; drupe oblong-lanceolate, about 2 in. long, obsoletely, when dry manifestly, 5-cornered, dull orange-yellow, smooth.

**HAB.**—Tenasserim.

\* \* *Fruit a dry nut with a chartaceous or fibrous-coriaceous pericarp, samaroid, or 3-5-cornered, with as many or fewer equal or unequal wings.*

7. *T. bialata*, Wall.—*Lein-pen*.—A tree (80—100+40—60+6—10), leafless in H.S., all parts glabrous, the leaf-buds rusty

puberulous; leaves crowded at the end of the branchlets, obovate, on a slender glandless petiole  $1\frac{1}{2}$ -2 in. long, unequally acuminate at the base, abruptly acuminate or apiculate, 4-6 in. long, chartaceous, glabrous; flowers small, greenish yellow, supported by a minute deciduous bract, forming simple puberulous axillary spikes usually as long as the leaves, the male flowers at the upper, the female ones at the lower part of the spike; calyx rusty pubescent, very densely rusty villous inside at the base, the tube 3-gonous; nut oblong,  $1\frac{1}{2}$ -2 in. long, more or less brown-velvety, equally tapering at both ends, 3-gonous, the 2 lateral angles expanded into 2 chartaceous striate-waved and velvety-wings about  $1-1\frac{1}{2}$  in. broad.

HAB.—Not uncommon in the upper mixed forests of the Andamans.—Fr. C.S.—l.—SS. = SiS.

8. *T. pyrifolia*, Kz.—*Lein-pen*.—A tree (60—80 + 30—50 + 5—8), shedding leaves in H.S., all parts glabrous or the leaf-buds greyish puberulous; leaves crowded at the end of the branchlets, oblong to broadly lanceolate, on a glandless slender petiole  $\frac{3}{4}$ - $1\frac{1}{2}$  in. long, acuminate at the base, shortly acuminate, 2-4 in. long, coriaceous, glabrous; flowers greenish yellow, small, forming a tawny puberulous spike in the axils of the leaves and usually longer than them; calyx densely tawny or brown-pubescent, and similarly but more densely villous inside, the tube  $\frac{1}{2}$  a line long, obsoletely 3-cornered; fruits only  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, 3-cornered, indistinctly brown-velvety, the 2 lateral angles expanded into 2 rounded striate chartaceous wings of about  $\frac{1}{2}$ - $\frac{3}{4}$  in. breadth.

HAB.—Frequent in the mixed forests, especially the upper and lower ones, from Pegu and Martaban down to Upper Tenasserim; rare in Prome.—Fl. H.S.; Fr. C.S.—l.—SS. = Metam. SiS.

REMARKS.—Wood not used; □' = 39 pd.

9. *T. myriocarpa*, Henrek & Muell-Arg.—An evergreen large tree, the young parts rusty pubescent; leaves opposite and more or less alternate, oblong, rounded at the base, on a thick 2-3 lin. long petiole usually conspicuously 1-glanded at apex,  $\frac{1}{3}$ -1 ft. long, rigidly chartaceous, glabrous, the lateral nerves beneath strongly prominent; flowers small, subtended by a minute glabrous bract, in tawny-velvety spikes arranged in an ample terminal leafy panicle; floral leaves lanceolate, 1-2 in. long, at base furnished with 1 or 2 large conspicuous glands; calyx, especially the flask-shaped tube, tawny pubescent, long-hirsute inside; fruits crowded and almost imbricate, the nut only  $1\frac{1}{2}$ -2 lin. long, 3-gonously lanceolate, indistinctly puberulous, 2 of the angles expanded into as many obliquely truncate or unequally 2-lobed oblong 2-3 lin. broad

yellowish or brownish almost glabrous wings, the third angle not winged or produced into a very small short linear wing.

HAB.—Ava, Khakyen hills east of Bhaino.—Fl. H.S. ; Fr. Jan.-March.

REMARKS.—Timber said to be excellent.

10. *T. alata*, Roth. (*T. tomentosa*, Roxb. ; Bedd. Sylv. Madr. t. 17 ; Brand. For. Fl. 225).—*Hlonkyan*.—A tree (40—60+10—25+3—6), shedding leaves in H.S., all softer parts greyish pubescent ; leaves from ovate-oblong to oblong, on a thick glandless petiole  $\frac{1}{2}$ —1 in. long, unequal at the base, almost blunt, 6—12 in. long, rather coriaceous, entire, rather glabrous and somewhat wrinkled above, beneath net-veined and more or less densely greyish pubescent, bearing 1 or 2 large turbinate somewhat stalked glands along the midrib far above the base ; flowers small, greenish, subtended by a small tomentose lanceolate bract, forming tomentose, solitary, axillary spikes often collected into axillary and terminal panicles ; calyx rusty pubescent, densely rusty villous inside at the bottom, the tube short ; fruits dry, glabrous or downy, from  $1\frac{1}{2}$  to nearly 2 in. long and broad, 5-winged, the wings semi-oblong, broader than the diameter of the nut.

HAB.—Common in the mixed forests, especially the lower ones, of Prome, Pegu, and Martaban.—Fl. H.S. ; Fr. C.S.—L.—SS.—Lat. *Arg. All. SiS.*

REMARKS.—Wood very heavy, the sap-wood pale-brown, the heart-wood dark-brown, fibrous, but close-grained ; takes very fine polish.

11. *T. crenulata*, Roth. (*T. arjuna*, Bedd. Sylv. Madr. t. 28 ; Brand. Sylv. Madr. 224).—*Hlonkyan*.—A tree (60—100+30—70+6—12), shedding leaves in H.S., all parts glabrous ; bark thick, brittle, dark-grey, deeply longitudinally cracked ; cut red ; leaves from elliptically and ovate-oblong to oblong, on a strong glandless petiole  $\frac{1}{4}$ — $\frac{3}{4}$  in. long, furnished with 2 almost stalked large turbinate glands along the midrib above the usually unequal base, almost entire or more usually obsolete crenate-toothed, acute or almost blunt, rather coriaceous, from 4—10 in. long, glabrous, above usually wrinkled, beneath smooth and in a dried state brown ; flowers small, greenish, subtended by a linear-lanceolate short bract, in glabrous or puberulous, rarely pubescent spikes in the axils of the lower leaves or collected into terminal and axillary panicles ; calyx outside glabrous or pubescent, the tube oblong, densely villous within ; fruits dry, very variable in size, glabrous, from  $1\frac{1}{2}$ — $2\frac{1}{2}$  in. long and broad, 5- but often only 4-winged, the wings semi-oblong, broader than the diameter of the nut.

Var. 1. *Roxburghii* (*T. glabra*, WA.) : bark smooth ; spikes and panicles puberulous or pubescent ; calyx pubescent all over, or the limb outside glabrous or nearly so ; fruits usually only 1- $1\frac{1}{2}$  in. across.

Var. 2. *macrocarpa* (*Pentaptera macrocarpa*, Wall.): bark rough and fissured; inflorescence and the whole calyx (except the dense rusty villosity at the bottom inside) glabrous; fruits usually (but not always)  $2\frac{1}{2}$  in. across.

HAB. Var. 1: frequent in the mixed forests of the Pegu Yomah and elsewhere; var. 2: common in all leaf-shedding forests from Chittagong, Prome, and Martaban down to Tenasserim, up to 2,000 ft. elevation.—Fl. H.S.; Fr. C.S.—L.—SS.=∞S;S.

REMARKS.—Heart-wood dark-brown. □'=58 pd. Used for house-posts and planking.

## COMBRETUM, L.

Flowers polygamously dioecious. Calyx-tube constricted above the ovary, the limb bell-shaped, 4- or 5-lobed, deciduous. Petals 4 or 5 (very rarely wanting), small, inserted between the calyx-lobes. Stamens 8 or 10, in 2 series, the filaments elongated, straight in bud; anthers didymous. Ovary 1-celled, with 2 to 6 suspended ovules; style subulate with simple stigma. Fruit coriaceous or almost spongy, 4- to 6-cornered or 4-6-winged, 1-seeded. Seeds elongate, the cotyledons various.—Shrubs, usually climber, rarely trees, with opposite or whorled, very rarely alternate, leaves. Flowers in spikes or racemes often collected into panicles. Bracts small or rather conspicuous.

\* Flowers 5-merous. Stamens 10, all equal or alternately shorter. Fruits usually 5- rarely 4- or 6-8-cornered or -winged.

× Calyx-limb abruptly cup-shaped.

○ No petals.

Leaves only  $1\frac{1}{2}$ -3 in. long; inflorescence greyish velvety; the floral leaves not discoloured . . . . .

*C. apetalum.*

○ ○ Petals present.

Leaves large, opposite; inflorescence rusty or tawny-tomentose, the floral leaves discoloured and white; fruits chartaceously 5-winged . . . . .

*C. decandrum.*

Leaves often whorled by 2-4, smooth, coriaceous; inflorescence greyish tomentose, without floral leaves; fruits with 5 sharp, thick, almost wing-like angles . . . . .

*C. trifoliatum.*

Similar to former, but leaves rigid, strongly nerved and net-veined; fruits sharply 4-cornered . . . . .

*C. tetragono-*  
*carpum.*

× × Calyx-limb bell-shaped, gradually narrowed into the tube.

Inflorescence, petioles, and branchlets all greyish or rusty puberulous or velvety . . . . .

*C. ovale.*

Inflorescence, petioles, and branchlets all rusty pilose; fruits 5-winged, puberulous . . . . .

*C. pilosum.*

\* \* Flowers 4-merous. Stamens 8, equal or alternately shorter. Fruits usually 4- (rarely 5-) winged or cornered.

× Calyx-limb bell-shaped, gradually tapering in the longer or shorter tube. Fruits winged, the wings chartaceous and broader than the diameter of the nut.

○ Flowers shortly pedicelled.

- All parts glabrous; inflorescence and flowers velvety . . . *C. extensum*.  
 ○ ○ Flowers all sessile.  
 All younger parts and inflorescence coppery or rusty-lepidote;  
 leaves large, opposite . . . *C. squamosum*.  
 Leaves, at least on the older branchlets, usually whorled by 3,  
 glabrous, while young minutely lepidote; inflorescence and  
 shoots puberulous . . . *C. Chinense*.  
 As former, but branchlets, petioles, and inflorescence all rusty  
 tomentose; leaves more or less pubescent beneath, never scaly *C. dactylochymum*.  
 × × Calyx-limb abruptly cup-shaped, the tube funnel-  
 shaped. Fruits winged or angular.  
 † Fruits 4- or 5-winged, the wings chartaceous; leaves  
 and fruits small.  
 × Body of fruit smooth.  
 Young shoots rusty pubescent; branchlets terete; leaves and the  
 4- or 5-winged fruits glabrous . . . *C. pyriforme*.  
 All parts, also the 4-winged fruits, more or less silvery lepidote;  
 branchlets 4-cornered . . . *C. quadrangulare*.  
 × × Body of fruit fibrillose . . . *C. Wallichii*.  
 † † Fruits 4-cornered, the angles thick and rounded.  
 Inflorescence and young branchlets rusty puberulous, the former  
 at the same time lepidote; leaves large, strongly nerved and  
 parallel-reined . . . *C. costatum*.  
 \* Flowers 5-merous. Stamens 10.

1. *C. apetalum*, Wall.—*Naboo-nway*.—A weak tree (15—25  
 + (?) + 1—1½), often half-scandent, shedding leaves in H.S., the  
 young shoots downy; leaves small, on a 2-3 lin. long slender petiole,  
 ovate-oblong, acuminate, entire, chartaceous, 1½-3 in. long, glossy  
 and glabrous, the nerves beneath puberulous, the under-surface usually  
 with a metallic hue; flowers very numerous, small, apetalous, each  
 supported by a minute subulate puberulous very deciduous bract,  
 racemose, the racemes puberulous, rarely simple and axillary, but  
 usually forming brachiato panicles in the axils of the upper leaves or  
 at the ends of the branches, usually furnished with small elliptical  
 floral leaves at the lower forkings; calyx velvety outside, pubescent  
 within, the limb abruptly cup-shaped, 5-lobed, the lobes reflexed  
 and linear-acuminate; tube oblong, terete or nearly so, shortly  
 and densely pubescent; fruits about ½-¾ in. long, 5-winged, the  
 wings chartaceous, striate, puberulous at the base.

HAB.—Common in the dry forests, especially the mixed ones, of Promo;  
 also Ava.—Fl. Sept.-Jan.; Fr. March.—l.—SS.—CaS.

2. *C. decandrum*, Roxb.; Brand. For. Fl. 220.—*Thama-ka-  
 nway*.—An evergreen large scandent shrub, the branchlets and  
 young shoots rusty pubescent; bark smooth, greyish brown; leaves  
 oblong to oblong-lanceolate, on a rusty-pubescent petiole 2-3 lin.  
 long, cuspidate-acuminate, entire, chartaceous, 4-6 in. long, glab-  
 rous or usually the nerves beneath appressed rusty puberulous;  
 flowers small, whitish, subtended by a long subulate-linear pubescent  
 bract, in rather short spikes, each supported by a discoloured white  
 or pale-green, 1-1½ in. long, membranous, glabrous or pubescent

floral leaf, the whole forming a densely rusty-pubescent panicle at the end of the branches or in the axils of the leaves; calyx densely rusty pubescent, 5-lobed, the tube elliptically oblong, 5-furrowed; petals 5, obovate-oblong, like the stamens twice as long as the calyx-lobes; fruits oblong, about an inch long, glabrous, shortly 5-winged, the wings about as broad as the diameter of the nut, chartaceous.

HAB.—Common all over Burma and the adjoining provinces, in all kinds of forests, especially the evergreen ones, up to 3,000 ft. elevation.—Fl. Nov.—Feb.—1 × s.—SS.=∞.

REMARKS.—Wood rather light, fibrous, but close-grained, pale-coloured, soft.

3. *C. trifoliatum*, Vent.—An evergreen large scrambling or scandent shrub, all parts glabrous or the young shoots puberulous; leaves opposite or often whorled by 3 or rarely by 4, from elliptically and obovate-oblong to oblong-lanceolate, usually acute or blunt with a mucro, on a glabrous or fugaceously pubescent petiole 1-2 lin. long, entire and usually waved, coriaceous, usually 3-4 in. long, sometimes much larger, glossy above, beneath smooth or rarely fugaceously pubescent along the midrib, with or without a tuft of hairs in the axils of the principal nerves; flowers small, whitish, subtended by a subulate appressed pubescent bract, forming densely tomentose or puberulous spikes arranged in simple or brachiate panicles at the end of the branchlets or in the axils of the leaves; calyx appressed greyish pubescent, densely hirsute inside, the limb shortly cup-shaped, 5-toothed, with the teeth lanceolate-subulate; petals longer than the calyx-teeth, elliptically lanceolate, fringed and appressed pubescent outside; fruits elliptically oblong, 1-1½ in. long, glabrous, sharply 5-angular, the angles almost wing-like produced, firmly coriaceous and much narrower than the diameter of the nut.

HAB.—Frequent in the swamp forests and along inundated banks of choungs all over Burma from Ava and Martaban down to Tenasserim.—Fl. Jan.-March; Fr. Apr.-June.—1.—SS.=All.

4. *C. tetragonocarpum*, Kz.—An evergreen large scandent shrub, all parts glabrous; leaves oblong to elliptically oblong, on a thick about a line long petiole, blunt or almost retuse, 3-5 in. long, coriaceous, conspicuously nerved and net-veined on both sides, glabrous; flowers small, whitish, subtended by a small subulate villous bract, forming robust, tawny villous, solitary spikes in the axils of the leaves and shorter than, or as long as, them, or collected in axillary and terminal poor brachiate panicles; calyx-tube shortly rusty villous, short, oval, the limb cup-shaped, hairy and lepidote outside, densely rusty villous inside, 4-toothed, with the teeth short and acute; petals minute; fruits an inch long or somewhat longer,

glabrous, pale-brown, elliptically ovate, 4-cornered, the angles thick cartaceous, sharp and almost wing-like prominent, much narrower than the diameter of the nut.

HAB.—Frequent in the swamp forests of the alluvial plains of Pegu.—Fl. Febr.-March; Fr. May.—L.—SS.—All.

5. *C. ovale*, R. Br.—*Kyet-tet-nray*.—A leaf-shedding spreading shrub, or, in shady forests, a large climber with arm-thick stems, the young shoots and branchlets densely rusty puberulous; leaves variable not only in size, but also in shape, from oval and elliptical to oblong-lanceolate, on a short and rather slender puberulous petiole, acuminate, acute or blunt, entire, chartaceous,  $1\frac{1}{2}$ -2 or often 3-4 in. long, glabrous, or beneath slightly and minutely appressed pubescent on the nerves; flowers middling-sized, pale rose-coloured, on very short appressed tawny-pubescent pedicels, subtended by an ovate-lanceolate, acute or acuminate, pubescent bract of 3-4 lin. length or larger, forming a tawny tomentose or densely puberulous bracted short opposite simple raceme on a very short peduncle or almost sessile and arising from above the scars of the fallen leaves and terminal; calyx bell-shaped-tubular, appressed tawny pubescent, 5-lobed; petals 5, obovate-lanceolate, nearly 3-4 lin. long, rather blunt, sparingly pubescent outside; stamens 10, long-exserted, with blue (?) anthers; fruits unknown.

HAB.—Rather frequent in the tropical and mixed forests of Pegu and Martaban, also in shrubberies and open forests, but rare.—Fl. March-May.—s: 1 & L.—SS.—petrophilous.

6. *C. pilosum*, Roxb.—A large woody climber, the branchlets and young shoots densely covered with rusty-coloured soft spreading hairs; bark pretty smooth, dark-brown; leaves from elliptically to oblong- or ovate-lanceolate, on a very short thick rusty-pilose petiole or sometimes almost sessile, acuminate, entire, chartaceous, 5-7 in. long, glabrous, sometimes fringed, the midrib and nerves beneath sprinkled with soft rusty hairs; flowers middling-sized, whitish, on short, rusty-pubescent pedicels and subtended by a linear-lanceolate, acuminate, appressed pubescent bract of 3-4 lin. length, forming brachiate short racemes usually supported by small, but rather broad, acuminate, more or less discoloured floral leaves, and collected into usually dense and rather short densely rusty-pilose or hirsute panicles at the end of the branches or in the axils of the leaves; calyx 3 to nearly 4 lin. long, densely appressed rusty pubescent, bell-shaped, 5-lobed; petals linear-oblong, blunt, about 2 lin. long, appressed tawny pubescent outside, white; stamens long-exserted, the anthers yellow; fruits about an inch long, ovate-oblong, puberulous, 5-winged, the wings chartaceous, broader than the diameter of the nut.

HAB.—Pegu, above Rangoon (Cleghorn); Tenasserim, from Moulmein down to Mergui.—Fl. January.

\* \* *Flowers 4-merous. Stamens 8.*

7. *C. extensum*, Roxb.—*Moung-ma-ka-nway*.—A large woody climber, all parts glabrous; leaves from broadly oblong to ovate-oblong and almost orbicular, on  $\frac{1}{2}$  an in. long petiole, acute, apiculate or shortly cuspidate, entire, chartaceous, 3-4 or usually 4-8 in. long, glabrous, usually pale-coloured beneath; flowers small, whitish, subtended by a very minute deciduous bract, forming either simple or forked short or elongate velvety spikes often collected in a panicle in the axils of the leaves or at the end of the branchlets; calyx nearly 3-4 lin. long, tubular-bell-shaped, velvety, the limb 4-lobed, densely tawny hispid at the throat; petals obovate, minute, shorter than the linear-lanceolate acuminate calyx-lobes; stamens long-exserted, the anthers yellow or orange; fruits about  $1\frac{1}{4}$  in. long, broadly oblong, glabrous, 4-winged, the wings semi-oblong, chartaceous, broader than the diameter of the nut.

HAB.—Common in all leaf-shedding forests, especially the mixed ones, all over Burma and adjacent provinces down to Tenasserim.—Fl. Jan.-March; Fr. May.-1.—SS. =  $\infty$ .

8. *C. squamosum*, Roxb.—A leaf-shedding, lofty, scandent shrub, with tortuous buttressed stems as thick as a man's thigh, all softer parts covered with minute rusty scales; bark about  $\frac{1}{2}$  an in. thick, corky and lenticellate, dark-brown; cut brown; leaves opposite, from broadly ovate-oblong to oblong-lanceolate, on a 3-4 lin. long lepidote petiole, apiculate, entire, almost coriaceous, 5-6 in. long or sometimes much smaller, above sparingly lepidote-dotted, beneath, especially while young, rusty or pale lepidote and dotted; flowers small, white, subtended by a subulate lepidote bract, in coppery lepidote spikes usually each supported by a small densely coppery-lepidote floral leaf, not only solitary, but more generally in panicles in the axils of the leaves and often collected into a compound larger one at the end of the branches; calyx densely coppery-lepidote, the tube 4-cornered, the limb eupular-bell-shaped, densely rusty-hirsute at the throat, 4-toothed; petals 4, obovate-lanceolate, acute, longer than the calyx-teeth; fruits broadly oblong, glabrous, nearly  $1\frac{1}{2}$  in. long, 4-winged, the wings chartaceous, semi-oblong, broader than the diameter of the nut.

HAB.—Frequent in the open, especially the low, but also the mixed, forests of Pegu and Martaban as far down as Tenasserim.—Fl. March-Apr.; Fr. C.S. and May-June.—1.—SS. = Dil. SiS.

REMARKS.—Wood rather light, coarse, fibrous, and porose, pale-brown.

9. *C. Chinense*, Roxb., hardly of Don.—An evergreen large woody climber with dark-brown and rather smooth branches, the

young shoots and branchlets minutely lepidote ; leaves crowded by 3-4 and usually whorled, from obovate-oblong to oblong and oblong-lanceolate, on a short but slender minutely lepidote petiole, apiculate, blunt, or sometimes almost retuse, entire, 3-5 in. long, almost coriaceous, above sprinkled with minute scales, glabrous beneath ; flowers small, white, supported by a subulate minutely scaly recurved bract, forming simple, solitary, minutely rusty lepidote spikes in the axils of the leaves, or by suppression of the leaves the spikes sometimes appearing panicle ; calyx tubular-bell-shaped, minutely and densely rusty-lepidote, the limb 4-lobed, inside at the throat much rusty-hirsute ; petals obovate, twice as long as the calyx-lobes ; fruit about  $1\frac{1}{2}$  in. long and nearly as broad, broadly oblong, glabrous, 4-winged, the chartaceous wings retuse at both ends, broader than the diameter of the nut.

HAB.—Not uncommon in the tropical forests of Martaban east of Tounghoo, up to 3,000 ft. elevation ; Chittagong.—Fr. March-Apr.—s : l.—SS.—Metam.

10. *C. dasystachyum*, Kz.—An evergreen large woody climber, much resembling the former species, but all parts more or less pubescent ; leaves opposite or more usually by threes, from elliptically to obovate-oblong, on a very short thick tawny- or rusty-pubescent petiole, acuminate, entire, 3-4 in. long, membranous, above sprinkled with minute white dots, beneath (along the nerves densely) pubescent ; flowers small, whitish, sessile (in Burmese specimens apparently bractless), forming rather robust, straight, spreading or decurved, densely rusty tomentose spikes in the axils of the leaves and much shorter than them ; calyx tubular-bell-shaped, the limb 4-lobed, densely tawny hispid inside ; petals broadly oblong, cuneately narrowed in a claw, longer than the calyx-lobes ; ovary soon glabrous, obsoletely 4-cornered ; fruits oblong, nearly  $1\frac{1}{2}$  in. long, about an inch broad, glabrous, 4-winged, the wings chartaceous, semi-oblong, much broader than the diameter of the nut.

HAB.—Rather frequent in the tropical forests of the eastern slopes of the Pegu Yomah and in Martaban east of Tounghoo, especially along choungs.—Fl. March-Apr.—s.—SS.—Metam. SiS.

11. *C. pyriformis*, Kz.—A scandent shrub (?) resembling *C. ovalifolium*, Roxb., the young shoots shortly rusty pubescent ; leaves small, from oval and broadly oblong to almost orbicular, opposite and alternate, on a slender petiole 3 to 4 lin. long, blunt or almost retuse and mucronate, entire, chartaceous,  $1\frac{1}{2}$ -2 in. long, glabrous and minutely dotted above ; flowers ... ; spikes puberulous, solitary, or in slender, axillary and terminal short panicles ; fruits rather small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, glabrous, 5- and 4-winged, the wings chartaceous, semi-oval, broader than the diameter of the nut.

HAB.—Ava.—Fr. Sept.-Nov. .

12. *C. quadrangulare*, Kz.—A somewhat scandent shrub, all softer parts more or less covered with silvery scales and dotted, the branchlets sharply 4-cornered; leaves opposite or rarely alternate, small, obovate-cuneate or rarely ovate, on a short but slender lepidote petiole, usually blunt or almost retuse and mucronate, entire,  $1\frac{1}{2}$ -3 in. long, chartaceous, on both sides (beneath rather densely) covered with silvery orbicular scales, and dotted; flowers small, white (?), supported by a subulate very fugaceous bract, forming simple, densely lepidote, solitary or paired spikes in the axils of the leaves and shorter than them; calyx funnel-shaped, hardly a line long, densely lepidote, the limb 4-toothed, densely tawny villous inside; petals somewhat longer than the 3-angular calyx-teeth, obovate; stamens exserted; fruits small,  $\frac{1}{2}$ - $\frac{3}{4}$  in. long and broad, almost orbicular, appearing whitish from numerous silvery scales, 4-winged, the wings chartaceous, broader than the diameter of the nut.

HAB.—Tenasserim.—Fl. Apr.-May.

13. *C. costatum*, Roxb.—A large woody climber, the young shoots rusty powdery and usually minutely scaly; leaves opposite or nearly so, oblong to elliptically oblong, on a 3-5 lin. long strong petiole, bluntish cuspidate or acuminate, entire, chartaceous, 6-9 in. long, glabrous, beneath along the prominent nerves more or less puberulous, but soon glabrescent, strongly transversely parallel-veined; flowers small, yellowish, supported by a thick, linear, short bract, in minutely scaly spikes usually arising on separate axillary leafy shoots and forming some sort of a leafy axillary panicle; calyx minutely scaly, cupular-funnel-shaped, 4-toothed, the teeth short and broad, acute; tube oblong, bluntish, 4-cornered, the limb glabrous inside; petals minute, yellow, lanceolate, acute; fruits linear-oblong, from  $1\frac{1}{2}$ - $1\frac{3}{4}$  in. long, glabrous, 4-angled, the angles thickened, solid and blunt, sharp and narrowed towards their upper end, about as broad as the diameter of the nut or narrower.

HAB.—Tenasserim.—Fr. Apr.-May.

14. *C. Wallichii*, DC.—A large scandent shrub, the young shoots rusty puberulous; leaves elliptical to elliptically oval, on a strong short petiole, rounded or obtuse at the base, shortly and rather abruptly acuminate or apiculate, 4-6 in. long, chartaceous, puberulous beneath and glabrescent; flowers small, rusty puberulous, supported by linear-subulate bracts longer than the tube and forming axillary solitary rusty-pubescent racemes shorter than the leaves and often collected into terminal panicles; calyx lepidote and obscurely rusty puberulous outside, the limb angular, 4-toothed, densely brown-hispid inside; petals small, obovate-cuneate, glabrous; fruits dry-chartaceous, rotundate in

4-winged, the wings striate, pale-brown, nearly doubly broader than the fibrillose-clothed nut.

HAB.—Ava, Khakyen hills; tropical forests of Chittagong.—Fl. R.S.; Fr. C.S.

### ANOGEISSUS, Wall.

Calyx compressed, 2-winged, the tube long and slenderly produced beyond the ovary, the limb bell-shaped or urceolate, 5-cleft, deciduous. Petals none. Stamens 10, in two series, the filaments exserted; anthers small, cordate. Ovary 1-celled with 2 suspended ovules; style filiform, with a simple stigma. Fruit small, straight, coriaceous, broadly trapezoid and 2-winged, terminating into the long persistent calyx-tube, 1-seeded. Cotyledons convolute.—Trees, rarely shrubs, with alternate simple leaves. Flowers minute, in slenderly peduncled globular axillary heads.

1. *A. acuminata*, Wall.; Bedd. Sylv. Madr. t. 16; Brand. For. Fl. 228.—*Yong-pen*.—A leaf-shedding tree (80—100+40—80+9—12), while young the trunk armed with numerous long spines (abortive branchlets), all softer parts more or less appressed-pubescent; bark about  $\frac{1}{2}$  an in. thick, dark brownish grey, densely covered with herbaceous, green, rounded pustules covered with a thin, easily separable, greyish membrane; leaves from lanceolate and ovate-lanceolate to oblong and linear-lanceolate, acuminate, on a short, slender, pubescent petiole, entire, 1-3 in. long, chartaceous, while young more or less densely silky pubescent, more or less glabrescent or quite glabrescent; flowers small, yellowish, crowded and sessile on the spherically thickened apex of the axillary, solitary, short, tawny or rusty pubescent peduncle; calyx densely tawny or rusty tomentose all over, or the limb outside glabrous or sparingly minutely pubescent; fruits glabrous, glossy.

Var. 1. *genuina*: leaves larger and longer, acuminate, usually densely silk-hairy, at least while young; bark densely pustulate; fruits trapezoid, nearly doubly broader than long, the apex and beak tawny pubescent or villous.

Var. 2. *phillyreaefolia* (*A. phillyreaefolia*, Heurk. & Muell-Arg.): leaves smaller, quite glabrous when full grown; bark often marmorate and more or less destitute of the pustules; fruits trapezoid, not much broader than long, quite glabrous and glossy; flower-heads nearly doubly smaller.

HAB.—Var. 1: frequent in the mixed forests all over Burma from Ava and Chittagong down to Tenasserim up to 3,000 ft.; var. 2: restricted to the savannah and swamp forests of the alluvial plains of Prome and Pegu, also Ava.—Fl. Feb.-March; Fr. Apr.-May.—s × l.—SS. = ∞ SiS.

REMARKS.—Wood uniformly brown, the heart-wood red-brown, heavy, close-grained, hard, strong, and durable; takes a fine polish. □'=50-57; break-weight=262 pd.—Good for building purposes and indoor-work; exposed to water it soon decays.

## QUISQUALIS, L.

Calyx-tube rather terete, very long produced beyond the ovoid ovary, deciduous, the limb 5-parted, small. Petals 5. Stamens 10; anthers ovate. Ovary 1-celled, with 3-4 pendulous ovules; style filiform, with a somewhat dilated stigma. Fruit dry-coriaceous, sharply 5-gonous or almost 5-winged, 1-seeded. Cotyledons (occasionally 3) fleshy.—Scandent shrubs, with opposite or almost opposite simple leaves. Flowers rather showy, in axillary or terminal short spikes or racemes.

1. *Q. Indica*, L.—*Da-wai-hmine*.—A large evergreen woody climber, all younger parts more or less pubescent or villous; leaves oblong to ovate-oblong, on a short tawny or rusty tomentose or puberulous petiole, acuminate, entire, membranous, especially beneath pubescent or sometimes villous, more or less glabrescent, from 2 to 5 in. long; flowers conspicuous, first white, then changing into rose and deep red, supported by a bract, sessile, alternating and distichous, forming short, tawny or rusty pubescent spikes in the axils of the leaves or at the end of the branchlets; bracts leafy, from ovate to linear-lanceolate, acuminate, usually pubescent, gradually smaller and narrower upwards; calyx-tube 2 to nearly 3 in. long, puberulous, hairy inside at the throat; petals elliptically oblong, blunt or nearly so, about  $\frac{1}{2}$  an in. long or shorter or somewhat longer, especially outside puberulous; fruits more than an inch long, glossy, deeply furrowed and sharply 5-angular, the angles coriaceous and wing-like.

Var. 1. *genuina*: bracts leafy, from ovate and lanceolate to linear-lanceolate; petals oblong or linear-oblong.

Var. 2. *villosa* (*Q. villosa*, Roxb.): bracts subulate to linear, small and inconspicuous; petals usually obovate and often almost notched.

Var. 3. *oxypetala*: as former, but the petals broadly lanceolate and acute or nearly so.

HAB.—Not unfrequent in the tropical and lower mixed forests from Ava and Pegu down to Tenasserim; var. 3: Ava, Kakhyen hills.—Fl. March-Apr.

## CALYCOPTERIS, Lamk.

Calyx-tube elongate-turhinate, obtusely 5-gonous, the limb broadly bell-shaped, 5-cleft, much enlarging after flowering. Petals none.

Stamens 10, in two rows, short, the filaments subulate; anthers didymous. Ovary 1-celled, with three suspended ovules; style subulate with a simple stigma. Fruit 5-gonous and 5-furrowed, crowned by the five spreading chartaceous large calyx-lobes, 1-seeded. Cotyledons convolute.—Scandent shrubs, with opposite simple leaves. Flowers in short axillary racemes often collected into terminal panicles.

Stamens  $\frac{1}{2}$  the length of the acute calyx-lobes . . . . *C. nutans*.

Stamens as long as the bluntish calyx-lobes . . . . *C. floribunda*.

1. *C. nutans*, Kz.—*Kyvol-nay-nway*.—A large scandent shrub, all softer parts more or less covered with a short tawny tomentum; leaves ovate-oblong to oblong, on a short rather slender shortly tomentose petiole, acuminate, entire, 3-5 in. long, chartaceous, above minutely, beneath shortly and usually densely, tawny or brownish pubescent, and while young almost villous; flowers about  $\frac{1}{4}$  in. in diameter, sessile, yellowish green, supported by a small thickly villous lanceolate bract, forming densely tawny tomentose spikes rarely simple, but usually arranged into more or less leafy-bracted panicles in the axils of the leaves and at the end of the branches; calyx densely and softly tomentose all over, the lobes oblong-lanceolate, acute; stamens 10, the longer ones about  $\frac{1}{3}$ - $\frac{1}{4}$  as long as the calyx-lobes; fruits small, about  $\frac{1}{4}$  in. long, villous, 5-angled and furrowed between the obtuse angles, crowned by the enlarged bell-shaped calyx-limb of nearly  $\frac{1}{2}$  an inch in length.

HAB.—Frequent all over Burma from Chittagong and Ava down to Tenasserim, especially in the mixed forests and along river banks in village-shrubbery, etc., up to 3,000 ft. elevation.—Fl. Jan.-March; Fr. Feb.-May.—1.—SS.=∞.

### LUMNITZERA, Willd.

Calyx-tube elongate, tapering at both ends, furnished with two bractlets adnate up to the middle of the tube; limb bell-shaped, equal or unequal, 5-lobed, persistent. Petals 5, spreading. Stamens 5 or 10; filaments filiform-subulate; anthers cordate. Ovary 1-celled with 2 to 5 suspended ovules; style filiform, with a simple stigma. Fruit woody, compressed and obtusely angular, crowned by the persistent calyx-limb, 1-seeded. Cotyledons convolute.—Trees or shrubs, with alternate simple fleshy-coriaceous leaves. Flowers small, in short axillary or terminal racemes or spikes.

Flowers white; stamens 10, about as long as the petals . . . *L. racemosa*.

Flowers crimson; stamens 5-10, twice as long as the petals . . . *L. littorea*.

1. *L. racemosa*, Willd.; Bedd. Sylv. Madr. 103, t. 21, f. 2; Brand. For. Fl. 221.—*Yengyé*.—An evergreen tree (20—40+ (?) + 2—4), remaining shrubby, all parts glabrous and glossy; bark rough; leaves cuneate-obovate, sessile, emarginate, slightly crenate,

fleshy-coriaceous, almost veinless, smooth and glossy,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long; spikes axillary, solitary, usually simple, 6-12-flowered, about as long as the leaves or shorter, the peduncle compressed; flowers sessile, small, white, supported by a very minute basal bract; calyx-teeth small; petals oblong, spreading, afterwards recurved; stamens 10, the alternating ones somewhat longer and about the length of the petals; drupe about  $\frac{1}{2}$  in. long, compressed-ovate-oblong, tapering into a narrow furrowed tube crowned with the calyx-limb, fibrous-woody and glossy.

HAB.—Frequent in the littoral forests, especially the tidal ones, and also in the sandy beach-forests, all along the shores from Arracan down to Tenasserim and the Andamans.—Fl. H.S.—1.—SS.—Sal.

REMARKS.—Wood strong and durable, useful for posts and other purposes in house-building.

2. *L. littorea*, Voigt.—An evergreen tree (20—40 + (?) + 2—4), in all parts agreeing with the former, but the petals are intensely crimson, and the stamens (5-10, usually 7) are about twice as long as the petals, the filaments very slender and crimson.

HAB.—Southern Tenasserim, in mangrove swamps.—Fl. Fr. Sept.—SS.—Sal.

## ILLIGERA, Bl.

Flowers hermaphrodite. Calyx-tube narrow-ovoid, constricted beyond the ovary, the limb 5-parted, deciduous, valvate. Stamens 5, epigynous, alternating with as many glands; filaments subulate-filiform, furnished with two spatulate or tubular staminodes at each side at the base; anther-cells opening by a slit along the inner edge; pollen echinulate. Ovary 1-celled, with a solitary pendulous ovule; style filiform, with a dilated stigma. Fruit coriaceous, wingless or broadly 2-4-winged; cotyledons plano-convex.—Scandent shrubs, with alternate 3-foliate leaves. Flowers subtended by 1 to 3 bractlets, small or middling-sized, forming lax peduncled cymes.

1. *I. appendiculata*, Bl.—A large woody climber with terete branches, the young shoots tawny-velvety; leaves 3-foliate, on a long glabrous or above slightly pubescent petiole; leaflets on 3-5 in. long petiolules, slightly tawny pubescent above, from ovate-oblong to almost oblong, and obovate-oblong, shortly and bluntish apiculate or almost blunt, entire and somewhat waved, almost coriaceous,  $2\frac{1}{2}$ -3 in. long, glaucous-green, quite glabrous or slightly pubescent on the nerves beneath, laxly net-veined; flowers rather small, white, supported by a small lanceolate tomentose bract at the base of the very short, thick, tomentose pedicel (often with two or three smaller bractlets on the pedicel itself), in small tawny tomentose or puberulous cymes forming larger, axillary, and

terminal pendulous panicles; calyx tawny-velvety, the lobes linear-lanceolate, acute, petaloid; petals furnished in their sinuses with a cuneate-notched gland; staminodes 10, cucullate and clawed, one at each side of the glandular-puberulous filaments; fruit about 1 in. long, the nut 4-cornered and velvety, 2-winged, the wings broadly oval, very blunt,  $1\frac{1}{2}$ -2 in. long, chartaceous, striate.

HAB.—Frequent in the tropical forests of the Pegu Yomah and the Martaban hills down to Tenasserim, up to 3,000 ft. elevation.—Fl. Sept.-Oct.; Fr. March.—s : l.—SS. = SiS. Metam.

### GYROCARPUS, Jacq.

Flowers unisexual or polygamous, the males numerous. Calyx 4-7-parted, the lobes equal or unequal, imbricate, in the females two of them much enlarging and becoming wing-like in fruit; calyx-tube adnate to the ovary or, in the males, wanting. Petals none. Stamens as many as calyx-lobes, or fewer or none in the females, inserted on the bottom of the calyx and alternating with as many club-shaped staminodes; anthers opening by 2 lateral valves. Ovary absent in males, in the females 1-celled with a solitary pendulous ovule; stigma sessile. Nut bony, terminated by the 2 wing-like elongate coriaceous calyx-lobes. Albumen none.—Trees, with alternate, simple or lobed leaves. Flowers very small, crowded in dense corymbose cymes.

1. *G. Jacquini*, Roxb.; Bedd. Sylv. Madr. t. 196.—*Penglait-thit-kouk*.—A leaf-shedding tree (60—80+40—50+4—8), all younger parts more or less puberulous or pubescent; leaves crowded at the end of the thick branchlets, broadly ovate or ovate-oblong, on a 1-4 in. long petiole, more or less acuminate, on young trees often 8-10 in. long and broadly and deeply 3-lobed, those of full-grown trees usually only 4-5 in. long and entire, rarely obsoletely lobed, truncate or cordate at the base, usually glabrous, rarely pubescent beneath or on both sides; peduncles chiefly from the axils of the upper leaves, rarely exceeding the petiole in length, each bearing a repeatedly branched cyme of densely crowded very small greenish yellow flowers, sometimes all males, sometimes with a few hermaphrodite or female ones scattered in the cyme or chiefly in its forks; drupes ovoid, usually about  $\frac{1}{2}$  in. long, dry, velvety, the two wings erect, obovate-cuneate and narrowly tapering at the base, blunt, 2-2 $\frac{1}{2}$  in. long, coriaceous, and usually minutely puberulous.

HAB.—Frequent in the coast forests and upper mixed forests, not far from the sea along the Andamans; also Tenasserim.—Fl. R.S.; Fr. C.S.—l.—SS. = SiS. Chloritic rocks.

REMARKS.—Wood white, very light and soft. Good for children's toys, boxes; etc.

## MYRTACEÆ.

Flowers regular, hermaphrodite or rarely by abortion polygamous. Calyx-tube more or less adnate to the ovary, the limb 4-5- (very rarely 3- or more than 5-) parted or toothed, or reduced to a narrow border or entirely wanting, imbricate or open in bud. Petals usually as many as calyx-lobes, much imbricate in bud, the outer ones sometimes larger in bud than the inner, or rarely all cohering and falling off in an entire operculum. Stamens indefinite, usually numerous, or rarely few and definite, inserted in 1 or several series on a thinner or thicker disk lining the calyx-tube above the ovary or close round the ovary-summit; filaments free, or rarely united at the base or separated into as many bundles as calyx-lobes; anthers versatile or basifix, longitudinally dehiscent or rarely opening in terminal pores. Ovary inferior, or rarely almost superior, but enclosed in the calyx-tube, 2- or more- (very rarely 1-) celled with 2 or more 1- or several-seriate ovules attached to the parietal or axile placentas; style simple, with a small, entire or rarely lobed stigma. Fruit inferior, very rarely half or almost wholly superior and supported by the calyx-tube, crowned with the persistent calyx-limb or its sear, either loculicidally capsular with as many valves as ovary-cells, or indehiscent and berry- or drupe-like. Perfect seeds often few, rarely numerous. Albumen none or almost none. Embryo and cotyledons various.—Trees or shrubs, very rarely undershrubs, with opposite or rarely alternate usually gland-dotted simple leaves. Flowers solitary or variously arranged into axillary or terminal inflorescences. Bracts 1 or more, bractlets 2, often minute and very fugaceous.

More than 50 species of this order, all woody plants, are found in Burma. Astringent principles prevail in the bark, and it is, therefore, often used for tanning purposes. Fragrant, aromatic, or pungent volatile oil is the prevailing quality of *Myrtaceæ*. The buds of *Caryophyllus aromaticus* yield our cloves; all-spice or pimento-pepper is derived from *Pimenta*. Several furnish good dessert-fruits, like guava, jambo, rose-apple. Heavy, usually brown-coloured timber is obtained from the various species of *Eugenia* and *Careya*.

\* Fruit a dry capsule, opening at the top into as many valves as cells to the ovary (very rarely indehiscent).

○ Stamens free or united into bundles, alternating with the petals. Leaves small or narrow.

+ Leaves opposite, narrow; stamens free, usually fewer than 20 . . . . . *Baeckea*.

++ Leaves alternating.

Stamens numerous, in a continuous series; flowers not in heads . . . *Leptospermum*.

Stamens united into 5 free bundles; flowers in heads or spikes . . . *Melaleuca*.

○○ Stamens united into bundles, opposite the petals; leaves alternate, rarely opposite . . . *Tristania*.

\* \* *Fruit an indehiscent berry or rarely a drupe.*

○ Leaves opposite, more or less distinctly gland-dotted.

× Stigma peltate or capitate. Testa of seeds hard.

† Ovary 1-celled, with 2 parietal placentas . . . *Rhodamnia*.

†† Ovary 2- or more-celled.

Ovary 5- or rarely 4-celled, with 2-6 ovules in each cell . . . *Decaspermum*.

Ovary 2- or more-celled, with numerous ovules in many series in each cell . . . *Psidium*.

×× Stigma simple, minute; ovary 2-3-celled with several ovules in each cell; seeds usually few; testa often membranous . . . *Eugenia*.

○○ Leaves alternate, not dotted.

Stamens all perfect; fruit fibrous-fleshy, with a single large seed without pulp . . . *Barringtonia*.

Outer or inner stamens or both without anthers; fruit a large berry with many seeds imbedded in pulp . . . *Careya*.

Only the inner series of stamens without anthers; berry corticate, 3-4-celled, with several seeds in each cell . . . *Planchonia*.

## MELALEUCA, L.

Calyx-tube bell-shaped or urceolate, at base adnate to the ovary, the limb 5-lobed, imbricate or open in bud. Petals 5. Stamens indefinite, much longer than the petals, united into 5 distinct bundles opposite the petals; anthers versatile, opening longitudinally. Ovary inferior or half-inferior, 3-celled, with few or numerous ovules in each cell attached to the peltate or 2-cleft placenta; style filiform with a peltate or capitate or frequently minute stigma. Capsule enclosed in the enlarged and hardened calyx, crowned by the free part of the tube, loculicidally 3-valved, the valves sometimes separable from the calyx into 3 cocci. Perfect seeds usually few, the testa thin. Embryo straight or hardly curved, the cotyledons flat, plano-convex or folded and embracing each other, longer than the radicle.—Trees or shrubs, with usually alternate, more or less narrow, 1-3- or more-nerved leaves. Flowers supported by a bract, sessile, in heads or spikes.

1. *M. leucadendron*, L.—An evergreen tree (25—30+10—15 +2—3) with pendulous branches, all parts glabrous or the shoots pubescent; bark white, spongy-lamellate, peeling off in large papery flakes; leaves alternate, elliptical to linear-lanceolate, oblique or falcate, blunt, acute, or acuminate, coriaceous, entire, 4-6 in. long, narrowed into a short petiole, 3-7-nerved with anastomosing veins, glaucous-green, glabrous; flowers small, white, in more or less interrupted elongate spikes solitary or several together, the rachis pubescent, tomentose or glabrous; calyx glabrous or pubescent, about 1½ lin. long, the lobes short, orbicular, often with scarious margin; staminal bundles under ½ an inch long, the claws usually short or sometimes longer than the petals, each terminating into 5 to 8 filaments; fruiting calyx usually about 2 lin. in diameter,

varying from globular to almost hemispherical; seeds obovoid or cucuriform.

HAB.—Lower Tennesseum, rare.

## TRISTANIA, R. Br.

Calyx-tube turbinate-bell-shaped or open, at the base adnate to the ovary, the limb shortly 5-lobed. Petals 5, much imbricate. Stamens indefinite, more or less united into bundles opposite the petals; free part of filaments filiform; anthers versatile. Ovary more or less inferior or free except the broad base, but enclosed in the calyx-tube, 3-celled, with several ovules in each cell; style filiform with a more or less capitate stigma. Capsule adnate or almost free, enclosed in, or protruding from, the persistent calyx, loculicidally 3-valved. Perfect seeds few in each cell, linear-cuneate, or at the summit expanded into a flat wing, the testa thin. Embryo straight, cotyledons broad and overlapping each other, as long as or longer than the radicle.—Trees or shrubs, with alternate or crowded pinninerved leaves. Flowers small, in-axillary cymes. Bracts none or very deciduous.

× Calyx-lobes blunt or nearly so.

Leaves sessile or almost so, rigidly coriaceous, glossy on both sides;

flowers sessile or nearly so; calyx about 8 lin. in diameter . . . *T. Merguensis*.

Leaves petioled, thin coriaceous, opaque beneath; flowers pedicelled;

calyx only 1½ lin. in diameter; capsule exserted . . . *T. Burmanica*.

× × Calyx-lobes subulate-acuminate; capsule hardly exserted *T. Griffithii*.

1. *T. Merguensis*, Griff.—An evergreen large shrub, 8 ft. high, the young branchlets and ramifications of the inflorescences more or less sharply angular and minutely puberulous or glabrescent; leaves somewhat crowded at the end of the branches, from lanceolate- to elliptically obovate, more or less cuneate at the base and decurrent on a very short petiole, or often sessile, more or less blunt or almost apiculate, rigidly coriaceous, variable in size, some very small, others 4-6 in. long, glabrous and glossy on both sides, not dotted beneath; flowers middling-sized, yellowish, ill-scented, almost sessile, or on very short, thick, minutely powdery pedicels subtended by a deciduous obovate-lanceolate bractlet of the length of the calyx, forming short, robust, densely puberulous cymes often collected into a dichotomously branched often corymb-like larger one in the axils of the upper leaves; peduncle 2-3 in. long, elongating in fruit; bracts or rather floral leaves small, in shape almost conform with the stem-leaves, deciduous; calyx puberous, about 3 lin. in diameter, densely pubescent inside, the teeth concave, short and blunt; petals rotundate, sinuate, about a line long; filaments united by 6-10 into 5 bundles, puberulous towards the base, about as long as the

petals; ovary whitish tomentose, broadly hemispherical, adnate to the base of the calyx.

HAB.—Lower Tenasserim.—Fl. Aug.

2. *T. Burmanica*, Griff.—*Young-yoh-pyee-zeng*.—An evergreen tree (20—10 + 2—5), the young shoots pubescent; bark grey, about  $\frac{1}{2}$  in. thick, fibrous, peeling off in thin, long, corky-fibrous flakes; cut dry, pale-brown; leaves from obovate-lanceolate to almost lanceolate and obovate, cuneate at the base and narrowed into a longer or shorter puberulous petiole, blunt or sometimes notched, 2-3 in. long, thin coriaceous, somewhat glossy above, beneath pale-coloured, opaque, and dotted; flowers small, white, on rather slender, 1-2 lin. long, slightly pilose pedicels, forming a short-peduncled, small, slightly and shortly pilose dichotomous cyme in the axils of the leaves; bracts linear-lanceolate, small, very deciduous; calyx about  $1\frac{1}{2}$  lin. in diameter, puberulous, shortly villous-pubescent inside, the teeth short, rather blunt; petals about  $\frac{1}{2}$  lin. long, rotundate; stamens unequal, united by 5-7 into very short bundles free almost to the base, about the length of the calyx-teeth; filaments puberulous; ovary half-superior, hemispherical, silvery-silk-hairy; capsules oblong, slightly appressed, pilose and glabrescent, protruding for more than  $\frac{1}{2}$  from the calyx; seeds about 2 lin. long, linear-lanceolate, laterally compressed and trigonous.

HAB.—Not unfrequent in the Eng forests along the eastern slopes of the Pega Yomah and more frequently from Martaban down to Tenasserim, ascending also the hill Eng and drier hill forests of Martaban up to 3,500 ft. elevation.—Fl. March-Apr.; Fr. Apr.-May.—I.—SS.—Lat. Metam.

3. *T. Griffithii*, Kz.—An evergreen small tree, the leaf-buds imbricate-sealy; leaves crowded at the end of the branchlets, lanceolate, tapering at both ends, almost entire, coriaceous, pellucid-dotted; cymes almost axillary, few-flowered, trichotomous; flowers rather large, white; calyx-tube turbinate; limb 5-parted, turning circumsciss, the lobes ovate, subulate-acuminate, petals rotundate; stamens in 5 bundles, each consisting of numerous stamens; filaments capillary, nearly as long as the petals; capsule hardly exerted, bordered by the circumsciss-annular calyx-limb; seeds angular.

HAB.—Lower Tenasserim.—Fl. Fr. Jan.

### RHODAMNIA, Jack.

Calyx-tube ovoid or almost globular, not produced beyond the ovary, the limb 4-lobed, usually persistent. Petals 4, spreading. Stamens numerous, free, in several rows; filaments filiform; anthers versatile. Ovary 1-celled, with several ovules attached to the 2 parietal placentas; style filiform; stigma usually peltate. Berry globular, small, usually crowned by the calyx-limb. Seeds usually few, reniform-globular or variously compressed, the testa hard.

Embryo horse-shoe-shaped, with a long radicle and very small cotyledons.—Shrubs or small trees, with opposite 3- or triplinerved leaves. Flowers usually small, in axillary short racemes or clusters. Bractlets small, deciduous.

1. *R. trinervia*, Bl.—A shrub, the branchlets densely puberulous; leaves from ovate-oblong to ovate-lanceolate, on a 3-4 lin. long petiole, acuminate, coriaceous,  $2\frac{1}{2}$ -5 in. long, glabrous and glossy above, beneath puberulous and green or covered with a silvery close minute pubescence, transversely nerved and veined between the 3 prominent nerves; flowers small, white, on 1-3 lin. long more or less velvety pubescent pedicels, several together clustered, or rarely solitary or by 2 or 3, in the axils of the leaves, or occasionally collected in a very short axillary raceme; calyx with 2 minute bractlets at base, puberulous or velvety or almost villous-pubescent, the lobes nearly a line long; petals obovate to elliptically obovate, about 2 lin. long; stamens about 10, shorter than the petals; berries almost globular, the size of a small pea, puberulous or glabrous, containing a few or up to 20 angular glossy seeds.

HAB.—Tenasserim, from Moulmein down to Mergui.—Fl. Aug.

### DECASPERMUM, Forst.

Flowers polygamously dioecious. Calyx-tube bell-shaped, not or scarcely produced beyond the ovary, the limb 4- or 5-lobed. Petals 4 or 5, spreading. Stamens numerous, in several rows, free; anthers versatile. Ovary 4- or 5-celled, with 2 or very few ovules in each cell, and sometimes each cell divided into 2 by a spurious dissepiment; style filiform with a peltate stigma in the perfect flowers. Berry globular, crowned by the calyx-limb. Seeds few, reniform-globular; the testa hard. Embryo horse-shoe-shaped or circular, the radicle long, the cotyledons short and linear.—Small trees or shrubs, with opposite pinninerved leaves. Flowers small in axillary racemes, often forming terminal leafy panicles.

1. *D. paniculatum* (*Nelitis paniculata*, Ldl.).—An evergreen tree (20—25 + 10—15 +  $\frac{1}{2}$ —1), flowering already while a shrub, the young shoots more or less silky-pubescent; leaves from ovate-lanceolate to almost lanceolate, on a slender puberulous petiole 2 lin. long, sharply acuminate, tapering at the base, 1-3 in. long, thin coriaceous, glabrous above, beneath, while very young, appressed silky-pubescent and glabrescent, the lateral nerves faint; flowers small, white, on 1-2 lin. long slender pubescent pedicels, forming short pubescent sometimes silky and silvery-white racemes in the axils of the leaves and much shorter than them, and usually collected in a more or less leafy panicle at the end of the branchlets; bracts linear-subulate; calyx hemispherical, about  $\frac{1}{2}$  lin. long

silvery silk-hairy, the lobes ovate, acute, almost equal, less pubescent or nearly glabrous, often ciliolate; petals about 2 lin. long, obovate-oblong; berries globular, the size of a pepper-kernel, minutely velvety, several-seeded.

HAB.—Common in the hill forests of the Martaban hills, and here freely springing up in deserted hill townships, at 3,000 to 4,000 ft. elevation; also Tenasserim.—Fl. March.—L.—SS.—Metam.

## PSIDIUM, L.

Calyx-tube bell-shaped, urceolate or pear-shaped, adnate at the base or high up, the upper free portion quite entire and closed over the corolla in bud and coming off entire or splitting irregularly. Petals 4 or 5, spreading. Stamens very numerous, inserted in many rows on the usually broad disk, free, the filaments filiform; anthers oblong or linear. Ovary 2-7- (usually 4-5-) celled, with numerous ovules in each cell attached in numerous rows to the two central often 2-lamellate placentas; style filiform, often thick; stigma peltate or capitate. Berry globular to pear-shaped, crowned by the calyx-limb, or the latter deciduous. Seeds few or many, the testa hard. Embryo curved, horse-shoe-shaped or almost circular, radicle very long, the cotyledons small.—Trees or shrubs, often villous or tomentose, with opposite penninerved leaves. Flowers usually rather large, by 1-3 on axillary or lateral peduncles, rarely numerous and cymose.

1. *P. guyava*, L.; Brand. For. Fl. 232.—*Ma-la-ka-pen*.—An evergreen tree (20—30 + (?) + 2—3), [a low shrub in a wild state in Sumatra, etc.], the young branches pubescent; bark quite smooth, greyish brown, peeling off in thin almost paper-like flakes; leaves oblong to ovate, on a very short strong petiole, usually acuminate or almost blunt, 3-5 in. long, appressed pubescent beneath, glabrescent, the lateral nerves parallel and very strong with conspicuous transversal veins and net-veination between; flowers rather large, white, fragrant, solitary or by 2-3 on  $\frac{1}{2}$ -1 in. long pubescent peduncles arising either solitary or rarely by 2-3 from the axils of the leaves; bractlets under the calyx 2, subulate; calyx-tube ovoid or globular, densely puberulous, the lobes broadly ovate, acute, nearly as long as the adnate part; petals broad, fully  $\frac{1}{2}$  an in. in diameter; berries large, the size and shape of an apple or pear, fleshy, many-seeded, crowned by the calyx-limb, when fully ripe yellow and glossy.

Var. 1. *pyriferum* (*P. pyriferum*, L.) : peduncles 1-flowered; fruits pear-shaped.

Var. 2. *pomiferum* (*P. pomiferum*, L.) : peduncles usually 2-flowered with a third flower in the fork; fruits globose or ovoid.

Han.—Generally cultivated in and around villages all over Burma, and sometimes half wild in village bushes.—Fl. Apr.-May; Fr. R.S.—SS.=∞.

## EUGENIA, L.

Calyx-tube from globular to narrow-turbinate and club-shaped, not or more or less produced beyond the ovary; lobes 4 or rarely 5, from large and imbricate to very short and hardly prominent on the truncate limb. Petals 4 or very rarely 5, either free and spreading, or more or less connivent, or connate and falling off in a single calyptra. Stamens numerous, in several series, free or collected into 4 obscure bundles; anthers versatile. Ovary 2- or very rarely 3-celled, usually with several ovules in each cell; style subulate, with a simple minute stigma. Fruit a berry or almost drupe-like, or nearly dry with a fibrous rind. Seeds either solitary and globular, or few and variously shaped by compression, the testa usually membranous, rarely cartilaginous. Embryo thick and fleshy, radicle very short, the cotyledons either united in an apparently homogeneous mass or more or less separable.—Trees or shrubs, with opposite, entire, penninerved leaves. Flowers large or small, in terminal or axillary inflorescences, rarely solitary. Bracts and bractlets usually minute and very fugaceous, rarely leafy and persistent.

\* *Calyx smooth inside, without an intrastaminal thickened ring; flowers usually small, the calyx-limb often obsolete and turning truncate after flowering. Berries often small, globular to ovoid, more or less suppy, 1- rarely 2-seeded.*

○ *Calyx elongate or shorter, and then more or less obversely conical.*

× *Flowers in simple or almost simple axillary racemes. Berries ovoid. Calyx very elongate.*

*Calyx tubular-narrowed, 1-½ in. long, the lobes broad and rounded; berry about an inch long, ovoid-oblong, crowned with calyx-lobes* . . . . . *E. clariflora.*

*Calyx clavate, ½-¾ in. long, the limb truncate; berry clavate-oblong, only ¾ in. long, crowned with the cup-shaped truncate calyx-limb* . . . . . *E. leptantha.*

× × *Flowers in more or less corymb-like axillary and terminal panicles. Calyx shorter.*

+ *Calyx contracted in a pedicel-like base.*

*Calyx smooth; leaves somewhat glaucous beneath; berries black* . . . . . *E. grata.*

*Calyx in a dried state granular-rough; berries white; leaves rather glossy beneath* . . . . . *E. Zeylanica.*

++ *Calyx sessile, not pedicel-like narrowed. Flowers in terminal (and sometimes also axillary) corymb-like panicles.*

*Leaves more or less linear, net-veined between the remote, indistinct, irregular, lateral nerves; a shrub* . . . . . *E. contracta.*

*Leaves more or less oblong, somewhat glaucescent beneath, not net-veined between the approximate parallel lateral nerves; a tree* . . . . . *E. bracte.*

○ ○ Calyx hemispherical to funnel-shaped, sessile or pedicel-like contracted at base.

× Leaves usually opaque, ordinarily green, the lateral nerves more or less distant, somewhat irregular and net-veined between. Inflorescence usually lateral from the older branches.

+ Calyx sessile, without a pedicel-like tapering base.

+ Leaves not glaucous beneath.

Petiole  $\frac{1}{2}$ – $\frac{3}{4}$  in. long; leaves not decurrent, broader; flowers more than 3 together; panicle longer peduncled, the last ramifications very short

*E. operculata*.

As former, but leaves more obovate; panicle very short peduncled or almost sessile, more lax; flowers often by threes

*E. obovata*.

Leaves acuminate decurrent in a short petiole, more acuminate

*E. panicata*.

+ + Leaves glaucous or glaucescent beneath.

Branchlets terete or nearly so; panicles more or less peduncled; calyx lobes obsolete, soon truncate.

*E. cinerea*.

+ + Calyx narrowed in a longer or shorter pedicel-like base; panicles short, sessile or nearly so, usually branched already from the base.

+ Lobes of calyx-limb distinct, up to  $\frac{1}{2}$  a lin. long.

Similar to *E. cinerea*, the branchlets greyish

*E. praecox*.

Branchlets brownish; racemes sometimes corymb-like, slender, short

*E. cerasoides*.

+ + Lobes of calyx-limb obsolete, the limb soon truncate.

Branchlets brown, at least while young (often wingedly) 4-cornered

*E. tetragona*.

Branchlets white, terete; panicles cyme-like, short

*E. balsamea*.

× × Leaves usually glossy, often drying blackish or brownish, the lateral nerves all thin and vein-like, more or less narrowly parallel-running.

+ Calyx narrowed in a larger or shorter pedicel-like base.

+ Inflorescence lateral from the older branchlets.

Calyx a line long, almost sessile; ramifications of panicle sharply 4-cornered; berries ovoid, the size of a pea; branchlets brownish

*E. fruticosa*.

Calyx 2 lin. long, tapering in a thick pedicel-like base; ramifications of the panicle obsoletely 4-cornered; berries ovoid-oblong,  $\frac{1}{2}$  in. long; branchlets white

*E. Jambolana*.

+ + Inflorescence terminal (and often on the same branch also axillary).

△ Branchlets brown.

|| Leaves bluntish acuminate to blunt.

Leaves thin coriaceous, the lateral nerves thin, but distinct; petiole 3 lin. long, slender

*E. cymosa*.

Leaves firmly coriaceous, the lateral nerves obsolete; petiole thick, not above a line long

*E. myrtifolia*.

|| || Leaves long and sharply acuminate.

Leaves almost chartaceous, pale-coloured beneath; petiole about 2 lin. long

*E. acuminatissima*.

△ △ Branchlets white.

Leaves bluntish acuminate, almost chartaceous, elegantly transversely veined

*E. venusta*.

+ + Calyx not or almost not contracted at the base, sessile. Leaves drying black or reddish.

† Branchlets white.

Leaves chartaceous; calyx-lobes about a line long; petals 2 lin. long or longer; filaments 4-5 lin. long . . . . . *E. rubens.*

Leaves of a thicker texture, the lateral nerves strong and prominent; calyx-lobes and petals shorter; filaments 2-3 lin. long; berries obovoid . . . . . *E. Thumra.*

†† Branchlets red-brown.

Habit of former, but lateral nerves thin and vein-like; berries almost globular, the size of a large cherry . . . . . *E. oblata.*

\* \* Calyx usually with a circular or 4-angular intrastaminal ring or the stamens on the thickened ring itself, the limb conspicuously 4-lobed, persistent; flowers often conspicuous. Berries usually large, more or less turbinate or ovoid, the endocarp thick, fleshy. Seeds large, few or solitary, usually accompanied by abortive ones.

○ Calyx-lobes in fruit spreading.

× Calyx less than  $\frac{1}{2}$  an in. long.

+ Flowers sessile.

† Leaves firmly coriaceous, glossy, the lateral nerves thin, parallel. Flowers in terminal and often also in axillary panicles.

Leaves 5-6 in. long, blunt or nearly so; panicles corymb-like, peduncled; berry obovoid-pear-shaped, about an inch long . . . . . *E. grandis.*

Leaves only 2-3 in. long, decurrent at base, bluntish apiculate . . . . . *E. lepidocarpa.*

Leaves cuneate at base; flowers in sessile reduced cluster-like panicles; ramifications very short and thick, joint-like . . . . . *E. pachyphylla.*

†† Leaves coriaceous, opaque, lateral nerves curved and distant.

Leaves long-petioled; panicle terminal, corymb-like . . . . . *E. tristis.*

+ + Flowers pedicelled. Leaves more or less chartaceous, the lateral nerves curved.

Flowers in axillary and terminal panicles; calyx-base thick, pedicel-like, the true pedicel very short or almost none . . . . . *E. lanceaefolia.*

Flowers in simple, slender, lateral, or axillary racemes; calyx-base filiform and pedicel-like; pedicels filiform, long . . . . . *E. Kurzii.*

× × Calyx an inch long or longer.

Leaves large, almost sessile, cordate or rounded at base; corymbs lateral and terminal . . . . . *E. formosa.*

○ ○ Calyx-lobes in fruit incurved or inflexed.

× Flowers sessile or nearly so.

Leaves cordate or rounded at base, the petiole very short and thick; corymbs terminal . . . . . *E. macrocarpa.*

Leaves sessile with a cordate base, blunt; branchlets white, terete; corymbs small, lateral . . . . . *E. amplexicaulis.*

Leaves petioled, acuminate at both ends; panicles cluster-like reduced, lateral . . . . . *E. Malaccensis.*

× × Flowers truly or spuriously pedicelled.

+ Leaves whorled by threes, narrow, obtuse at base.

Leaves linear-lanceolate, almost sessile or very shortly petioled; petals 4-16 . . . . . *E. polypetala.*

+ + Leaves opposite.

† Leaves rounded at base. Fruits obversely turbinate, waxy, white or rose-coloured.

Branchlets usually 4-cornered and often wingedly so, white or pale-coloured; leaves acuminate, the marginal nerve as strong as the nerves themselves . . . . . *E. aquea.*

Branchlets terete, brown; leaves bluntish, the marginal nerve faint . . . . . *E. Javanica.*

† † Leaves acute at base, narrow, petioled.

Fruit almost globular or ovoid, dull-yellow . . . . . *E. Jambor*.

\* *Calyx smooth inside, without an intrastaminal thickened ring; flowers usually small, the limb often obsolete and turning truncate after flowering. Berries often small, globular to ovoid, more or less sappy, 1- rarely 2-seeded.*

○ *Calyx elongate, or shorter and in this case more or less obversely conical.*

1. *E. claviflora*, Roxb.—An evergreen tree (25—30+3—6 + 2½—4), all parts quite glabrous; leaves lanceolate, acute at the base, on a short stout, or rather slender petiole 1-3 lin. long, acuminate, thin coriaceous, 3-6 in. long, glabrous, the midrib impressed above, prominent beneath, the lateral nerves numerous, irregular, faint, anastomosing towards the margin; flowers variable in size, from ½ to 1 in. long, sessile or nearly so, forming axillary, short, glabrous racemes (sometimes reduced or, according to Roxburgh's figure, short-panicle with small bracts) in the axils of the leaves; calyx elongate, tubular, tapering at base, the limb 4- or 5-lobed, the lobes rounded and broad, but short; petals 4 or 5, free, white, orbicular-obovate, about 3 lin. long; filaments slender, glabrous; berries ovoid-oblong, about an inch long, bluish black, smooth, sappy and edible, 1-seeded, crowned by the incurved calyx-limb.

HAB.—Not unfrequent in the tropical coast forests of the Andamans; also Chittagong and Tenasserim.—Fr. Feb.—s.

2. *E. leptantha*, Wight.—An evergreen tree (25—30+6—8 + 3—4), all parts glabrous; leaves lanceolate to oblong-lanceolate, acuminate at both ends, on a 1-2 lin. long petiole or almost sessile, thin coriaceous, entire, 2-1 in. long, glabrous, the midrib impressed above and prominent beneath, the lateral nerves numerous, faint, more or less irregular, anastomosing along the border; flowers rather small, about ¼ to ½ in. long, sessile, with a filiform calyx-base, forming a short, glabrous raceme (sometimes reduced, or the basal flowers ternary on a very short peduncle) in the axils of the leaves or above the scars of the fallen ones; calyx smooth, clavate-funnel-shaped, about ½ in. long or somewhat filiform-tapering at the base, the limb almost truncate; petals 4 or 5, orbicular, clawed, about a line long or longer, free; filaments glabrous; berries clavate-obovate, about ½ in. long, smooth, 1-seeded, crowned by the truncate cup-shaped limb.

HAB.—Rather rare in the tropical forests along the eastern and southern slopes of the Pegu Yomah; also Tenasserim and more frequently in the coast forests of the Andamans.—Fl. Feb.; Fr. Apr.-May.—s.—SS.=SiS.

3. *E. grata*, Wall.—An evergreen small tree, all parts glabrous; leaves ovate-oblong and lanceolate to narrow-lanceolate,

on a 1-2 lin. long petiole, acute or obtuse at the base, bluntish acuminate, 2-3 in. long, coriaceous, entire, glabrous, somewhat glaucous and opaque beneath, the midrib impressed above and prominent beneath, the lateral nerves unequal, faint, anastomosing towards the margin; flowers rather small, white, sessile, with a pedicel-like calyx-base, usually by 3-7, forming a brachiate glabrous panicle in the axils of the leaves and at the end of the branchlets; calyx smooth, in a dried state longitudinally folded-wrinkled, about  $\frac{1}{4}$  in. long, contracted in a short pedicel-like stalk, the 5 lobes broad and narrow, rounded or somewhat acute; petals 5, almost orbicular, about a line long; filaments slender, glabrous; berries ovoid, elliptical, the size of a pea, smooth, blackish (?), somewhat pruinous, crowned by the short calyx-limb, 1-seeded.

HAB.—Tenasserim, apparently frequent.—Fl. Jan.-March.

4. *E. Zeylanica*, Wight.; Bedd. Sylv. Madr. t. 202.—*Thayay-pouk*.—An evergreen tree (25—30+8—12+2—3), all parts glabrous; leaves ovate-lanceolate to lanceolate, obtuse or acute at base, on a 1-2 lin. long petiole, 1-2 $\frac{1}{2}$  in. long, entire, bluntish-acuminate, thin but rigidly coriaceous, glossy on both sides, beneath somewhat pale-coloured, the midrib impressed above and prominent beneath, the lateral nerves numerous, rather parallel, very faint, anastomosing towards the margin; flowers white, sessile, with a pedicel-like calyx-base, usually ternary and forming a rigid brachiate glabrous panicle in the axils of the upper leaves and at the end of the branchlets; calyx obovate-cuneate, at the base pedicel-like contracted, usually granular-tubercled, pruinous, about 2 lin. long, the 4 or 5 lobes small and rounded; petals 4 or 5, almost orbicular, about a line long, free; filaments long and slender, glabrous; berries globular, white, the size of a pepper-kernel or very small pea, crowned by the lobed calyx-limb, sappy, 1-seeded (?).

HAB.—Not unfrequent in the tropical forests of the Andamans; also in Tenasserim.—Fl. May-June.—s.—SS.=SiS. Chloritic rocks.

5. *E. contracta*, Wall.—An evergreen small shrub, 2-4 ft. high, all parts quite glabrous; leaves linear to linear-oblong, acuminate at the base, on a rather strong petiole 1-2 lin. long, bluntish or bluntish acuminate, entire, thin chartaceous, 2-3 in. long, glabrous, the midrib somewhat impressed above and prominent beneath, the lateral nerves and the confluent copious net-veination faint, but prominent, anastomosing towards the margin; flowers small, white, by 3-5, sessile with a narrow calyx-base, forming a glabrous, brachiate, stiff, corymb-like panicle at the end of the branchlets and occasionally in the axils of the leaves; calyx tubular-funnel-shaped, about 2 lin. long or a little longer, smooth, the limb widened, almost truncate, the 4 lobes

forming only a narrow margin; petals 4, orbicular, free but calyptrate, deciduous; filaments slender, glabrous; berries unknown.

HAB.—Frequent in the stony or rocky beds of choungs in tropical forests from Martaban east of Tounghoo down to Tenasserim.—Fl. March-Apr.—1.—SS.—Metam.

REMARKS.—Wood rather heavy, of a somewhat unequal fibre, but close-grained, yellowish white turning pale-brownish, rather soft.

6. *E. bracteolata*, Wight.—An evergreen tree, all parts glabrous, the branchlets greyish; leaves oblong to obovate-oblong, acute or acuminate at the base, on a 2-4 lin. long petiole, bluntish or blunt-apiculate, 3-5 in. long, entire, chartaceous, glabrous, glaucescent beneath, the midrib not impressed above, prominent beneath, the lateral nerves very thin and numerous, parallel, anastomosing near the margin; flowers small, white, sessile, usually by 3 or more, forming a brachiate, shorter or longer peduncled, glabrous, corymbose panicle, the ramifications sharply 4-gonous; bracts and bractlets small, but distinct, ovate, acute, thick coriaceous; calyx about a line long or a little longer, obversely conical, the limb 4-lobed, lobes broadly rotundate; filaments rather short, but slender, glabrous; petals 4; calyptrate deciduous; unripe berry oblong, smooth, crowned by the 4-lobed incurved calyx-limb, 1-seeded.

HAB.—Tenasserim.

○ ○ *Calyx hemispherical to funnel-shaped, sessile or pedicel-like contracted at the base.*

7. *E. operculata*, Roxb.; Brand. For. Fl. 234 (*E. nervosa*, Bedd. Sylv. Mndr. 106, not DC.).—*Tea-thaly-ay*.—An evergreen tree (30—50 + 5—15 + 3—6), all parts glabrous; leaves variable, from ovate-oblong to elliptical and elliptically obovate, acute at the base, on a  $\frac{1}{2}$ — $\frac{3}{4}$  in. long petiole, bluntish apiculate to bluntish and shortly acuminate, 4-7 in. long, chartaceous, entire, glabrous, the numerous nerves thin but prominent, pretty regular and rather close, anastomosing towards the margin, the net-veination thin and lax; flowers small, white, sessile, clustered by 3 or more and forming a brachiate, shorter or longer peduncled, glabrous panicle above the scars of the fallen leaves; calyx cyathiform, funnel-shaped, narrowed at the base,  $1\frac{1}{2}$ —2 lin. long, smooth, the limb truncate; petals 4, concave-orbicular, about a line long or somewhat longer, free; filaments rather short, glabrous; berries more or less globular, the size of a pea, sappy, purplish-black, crowned by the cup-shaped calyx-limb, usually 1-seeded.

Var. 1. *operculata* (*E. operculata*, Roxb.): flowers more than 3 together; panicle longer peduncled, the extreme ramifications very short; leaves more acuminate.

Var. 2. *obovata* (*E. obovata*, Wall.): leaves more obovate, more

or less apiculate; panicles very short peduncled or almost sessile, more lax; flowers usually by threes.

HAB.—Var 1: not unfrequent in the swamp forests of Pegu, Martaban, and Upper Tenasserim; var. 2: Burma, probably Ava.—Fl. May.—SS.—All. Metam.

8. *E. Paniala*, Roxb.—An evergreen large tree, all parts quite glabrous; leaves lanceolate to broadly or obovate-lanceolate, cuneate-acuminate at the base and decurrent on the short  $\frac{1}{4}$  to  $\frac{1}{3}$  in. long petiole, acuminate, 3-5 in. long, entire, thick chartaceous, glabrous, the lateral nerves copious, thin but prominent, rather regular, areuately anastomosing towards the margin; flowers small, sessile, usually by threes, clustered, forming a longer or shorter peduncled, brachiate, often large panicle above the scars of the fallen leaves; calyx cyathiform, about  $1\frac{1}{2}$  lin. long, tapering at base, smooth, the limb obsoletely and roundedly 4-toothed, soon truncate; petals 4, about a line long, orbicular, free; filaments rather short, glabrous; berries (accord. Roxburgh) about the size of a small gooseberry and very juicy.

HAB.—Chittagong.—Fl. Apr.; Fr. June.

9. *E. cinerea*, Wall.—An evergreen tree, all parts glabrous, the branchlets terete or nearly so, whitish; leaves broadly lanceolate to oblong-lanceolate, cuneate-acuminate at the base, on a  $\frac{1}{2}$ - $\frac{3}{4}$  in. long petiole, bluntish acuminate, 3-5 in. long, entire, pergamaceous, glabrous, opaque, more or less pale-coloured beneath, the lateral nerves thin, but prominent, rather distant, somewhat arched, anastomosing towards the margin, with very faint or obsolete net-veination between; flowers small, white, sessile, clustered usually by 3, forming a brachiate, sessile, from the base divided or peduncled, glabrous panicle arising from the end of the older branchlets or laterally from the base of the young shoots; calyx about a line long, smooth, obversely conical, the limb shallowly and obsoletely 4-lobed and soon turning truncate; petals 4, orbicular, hardly a line long, calyptrately deciduous(?); berries globular, the size of a pepper-kernel, sappy, purplish black, smooth, crowned by the minute calyx-limb, 1-seeded.

HAB.—Very rare in the tropical forests of the southern parts of the Pegu Yomah; Tenasserim, from Moulmein down to Mergui.—Fl. Apr.; Fr. Feb.—s.—SS. = SiS.

10. *E. praecox*, Roxb.—An evergreen stout tree, all parts glabrous, the branchlets greyish; leaves oblong-lanceolate, acute at the base, on a  $\frac{1}{2}$  in. long petiole, 3-5 in. long, rather blunt, glabrous, coriaceous(?), glaucescent beneath, the lateral nerves coarse, rather distant and curved, anastomosing along the margin; flowers small, white, sessile, with a narrow pedicel-like calyx-base, usually by 3, forming rather short, brachiate, glabrous panicles, which are

simple and peduncled or sessile and branched from the base, and arise from above the scars of the fallen leaves and from the axils of the leaves; calyx about a line long, hemispherical, narrowed in a pedicel-like base of the length of the calyx itself, smooth, the limb distinctly 4-lobed, the lobes rounded, nearly  $\frac{1}{2}$  lin. long; petals 4, obovate-orbicular, somewhat longer than a line, free; filaments very long and slender, glabrous.—(Description after Roxburgh's MS. drawing.)

HAB.—Hilly parts of Chittagong.—Fl. January.

11. *E. tetragona*, Wight.—An evergreen tree, all parts glabrous, the branchlets brown, 4-cornered (the young shoots often wingedly so), the older ones turning more or less terete; leaves elliptically oblong to obovate-oblong, acute to cuncate at the base, on a strong  $\frac{1}{2}$  to  $\frac{1}{2}$  in. long petiole, entire, coriaceous, 3 to 6 in. long, blunt-apiculate or shortly and bluntish acuminate, glaucescent and opaque beneath, the lateral nerves thin but prominent, rather distant, anastomosing along the margin; flowers small, white, sessile with a narrowed calyx-base, usually by threes, forming stiff, short, brachiate, glabrous, sessile panicles branched already from the base, solitary or several together arising from above the scars of the fallen leaves or rarely axillary; calyx smooth, hemispherical, about a line long, with a thick pedicel-like contracted base nearly as long, the limb obsolete and broadly toothed and truncate; petals 4, orbicular-concave, free(?); filaments short, glabrous; berry globular, the size of a pea, smooth, 1-seeded.

HAB.—Ava, Kakhien hills, at 3,000 to 4,000 ft. elevation.—Fl. Nov.-Jan.

12. *E. cerasoides*, Roxb.—*Thabyay-chin*.—An evergreen tree (40—60—18—30 + 5—8), all parts quite glabrous, the branchlets brownish; leaves oblong-lanceolate to broadly and almost obovate-lanceolate, acute or acuminate at the base, on a short 2 to 3 lin. long petiole, bluntish acuminate or apiculate, 2-3 $\frac{1}{2}$  in. long, entire, thick chartaceous, glabrous, the lateral nerves thin but prominent, rather distant but irregularly curved, arcuately anastomosing; flowers small, white, sessile, with a narrow pedicel-like calyx-base, usually by threes, forming brachiate, rather slender, glabrous, sometimes corymb-like racemes arising solitary or by 2 or even 3 from above the scars of the fallen leaves along the older branches below the leafy terminal branchlets; calyx hardly a line long, hemispherical, smooth, contracted in a short pedicel-like base, the limb distinctly 4-lobed, the lobes broadly rotundate, small; filaments slender but rather short, glabrous; berries globular, the size of a large pea or small cherry, purplish black, smooth, sappy, crowned by the involute 4-lobed calyx-limb, 1-seeded.

HAB.—Chittagong; Tenasserim as far south as Mergui.

13. *E. balsamea*, Wight.—An evergreen tree, all parts glabrous, the branchlets white; leaves obovate-oblong to oblong-lanceolate, cuneate or acuminate at the base, on a 2-3 lin. long petiole, bluntish or bluntish apiculate, chartaceous, entire, 3-5 in. long, glabrous, pale green on both sides, the lateral nerves rather distant, thin but prominent, almost curved and anastomosing towards the margin; flowers small, white, sessile, with a slender, abruptly contracted, pedicel-like calyx-base of about a line length, usually by 3 (the middle one often sessile), forming small, slender, brachiate, glabrous, corymb-like panicles usually arising by 2-3 above the scars of the fallen leaves or in the leaf-axils themselves; calyx cyathiform, smooth, hardly a line deep, abruptly contracted in the pedicel-like clavate base; limb minutely 4-toothed, soon turning truncate; petals 4; filaments rather short, glabrous; berries (unripe) globular, smooth, crowned by the truncate cup-shaped calyx-limb, 1-seeded.

HAB.—Burma (according Dr. Mason); probably to be found in the Arracan or Ava hills.

14. *E. fruticosa*, Roxb. — *Thabyay-nee*.—An evergreen tree (40—50 + 15—20 + 4—6), all parts quite glabrous, the branchlets brown; bark grey, 1 in. thick, minutely fissured, coneoidly peeling off; cut brown; leaves elliptically oblong to oblong-lanceolate, acute at the base, on a  $\frac{1}{2}$ — $\frac{1}{2}$  in. long petiole, bluntish or apiculate, 2-3 in. long, entire, thin coriaceous, glabrous, the midrib impressed above and prominent beneath, the lateral nerves very numerous, faint, irregularly parallel, anastomosing towards the margin; flowers small, white, sessile, clustered by 3 or usually more, forming a brachiate, rigid, glabrous panicle arising from above the scars of the fallen leaves along the older branches below the leafy shoots; calyx obversely conical, sessile, smooth, about a line long, the limb truncate; petals 4, usually calyptrately deciduous; filaments slender, glabrous; berries ovoid, the size of a small pea, smooth, bluish black, crowned by the truncate cup-like calyx-limb, 1-seeded.

HAB.—Frequent in the open, especially the Eng forests, along the eastern slopes of the Pegu Yomah and from Martaban down to Tenasserim; also Chittagong.—Fl. Apr.; Fr. May-June.—l.

REMARKS.—Wood hard, heavy, brown.

15. *E. Jambolana*, Lank.; Bedd. Fl. Sylv. t. 197; Brand. For. Fl. 233, t. 30.—*Thabyay-hpyoo*.—An evergreen tree (50—80 + 18—30 + 5—12), often shedding leaves in the drier parts of Burma during H.S., all parts quite glabrous, the branchlets white; bark grey, about an inch thick, fibrous, and peeling off in small rounded flakes; cut red; leaves elliptically oblong to broadly and obovate-lanceolate, acute or acuminate at the base, on  $\frac{1}{2}$ —1 in. long petiole, bluntish acuminate, entire, thin coriaceous,

2-4 in. long, glabrous, the midrib impressed above and prominent beneath, the lateral nerves all very numerous and very faint, irregularly parallel and anastomosing along the margin; flowers small, whitish, sessile, with a thick pedicel-like calyx-base, usually by 3 or more clustered and forming a brachiate, glabrous, rigid panicle above the scars of the fallen leaves below the younger leafy branchlets; calyx funnel-shaped, about 2 lin. long, smooth, the thick base pedicel-like; limb obsoletely and broadly 4-lobed, soon truncate; petals 4, orbicular, about a line long, calyptrately deciduous or free; filaments long, glabrous; berries ovoid-oblong, often somewhat oblique, about  $\frac{1}{2}$  in. long, purplish black, sappy, smooth, crowned by the truncate calyx-limb, 1-seeded.

HAB.—Frequent all over Burma in all kinds of leaf-shedding forests, but chiefly in the mixed forests, entering also the tropical forests, up to 2,000 ft. elevation.—Fl. Apr.-May; Fr. May-June.—s+l.—SS.=∞.

REMARKS.—Wood heavy, hard, brown, close-grained, but brittle. Bark, like that of most other species of this genus, good for tanning purposes.

16. *E. cymosa*, Lamk.—An evergreen shrub, 4-6 ft. high or higher, and growing out into a little tree, all parts quite glabrous, the branchlets brown, almost terete; leaves from elliptical to elliptically-oblong and broadly lanceolate, on a slender 1 to 2 lin. long petiole, acute at the base, bluntish cuspidate-acuminate,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, thin coriaceous, entire, glossy, glabrous, in a dried state fuscous-black, the midrib impressed above and prominent beneath, the lateral nerves very faint, numerous and approximate, parallel, anastomosing along the margin; flowers small, white, sessile, with a contracted short pedicel-like calyx-base, often by 3, forming a brachiate, corymb-like, glabrous panicle in the axils of the leaves and at the end of the branchlets, the ramifications obsoletely 4-cornered; calyx cyathiform, about a line long, tapering in a pedicel-like base; limb wide, almost truncate, the 4 lobes obsolete, repand; petals 4, orbicular, free; filaments slender, glabrous; berries almost globular or didymous, the size of a pea, sappy, bluish black, crowned by the cup-shaped calyx-limb, 1- or 2-seeded.

HAB.—Southern Tenasserim.—Fl. Nov.

17. *E. myrtifolia*, Roxb.—An evergreen large shrub or small tree, all parts glabrous; leaves from lanceolate to oblong-lanceolate, or occasionally elliptical, acute at the base, on a short up to a line long petiole, bluntish, blunt-apiculate or bluntish acuminate,  $1-2\frac{1}{2}$  in. long, thin but rigidly coriaceous, entire, glabrous, glaucescent beneath, the midrib impressed above and slightly prominent beneath, the lateral nerves almost invisible; flowers small, white, sessile, with a short pedicel-like calyx-base (the lower ones often

spuriously jointed-pediceled), forming a brachiate, more or less raceme-like, stiff, glabrous panicle in the axils of the upper leaves and at the end of the branchlets; calyx nearly  $1\frac{1}{2}$  line long, bell-shaped, shortly and pedicel-like contracted at the base, smooth, the limb almost truncate, with 4 minute broad teeth; petals 4, orbicular, about a line each way, free, but calyptrately deciduous; filaments slender, glabrous; berries globular, the size of a pea, sappy, bluish black, smooth, crowned by the cup-shaped truncate calyx-limb, 1-seeded.

HAB.—Tenasserim, Moulmein district.

18. *E. acuminatissima*, Kz.—An evergreen tree, all parts glabrous; leaves lanceolate to oblong-lanceolate, acuminate at the base, on a 2-3 lin. long petiole, long caudate-acuminate,  $2\frac{1}{2}$ - $3\frac{1}{2}$  in. long, thin coriaceous, entire, glabrous, somewhat pale-coloured beneath, the midrib impressed above and prominent beneath, the lateral nerves faint, irregular, anastomosing towards the margin; flowers small, white, sessile, with a pedicel-like contracted calyx-base, usually by threes, forming a brachiate, rather compound, glabrous panicle at the end of the branchlets; calyx hemispherical, contracted in a pedicel-like about a line long base, glabrous and smooth, about a line long, the limb almost truncate; petals 5-6, free, minute; filaments very short, glabrous; anthers didymous.

HAB.—Tenasserim or Andamans.

19. *E. venusta*, Roxb.—*Thabyay-kha*.—An evergreen tree (50—70 + 20—25 + 6—8), all parts quite glabrous, the branchlets greyish; bark grey, an inch thick, rather smooth and soft; cut dryish, brownish; leaves elliptical to elliptically oval, obtuse or acute at the base, on a slender  $\frac{1}{3}$  to  $\frac{1}{2}$  in. long petiole, rather abruptly and bluntish acuminate,  $1\frac{1}{2}$ - $2\frac{1}{2}$  in. long, thin coriaceous or almost thick chartaceous, entire, glabrous, the midrib impressed above and prominent beneath, the lateral nerves very numerous and crowded, almost obsolete, parallel and anastomosing towards the margin; flowers small, white, sessile, with a pedicel-like contracted calyx-base, usually by threes, forming brachiate, glabrous panicles along the older branchlets and also in the axils of the leaves of the younger branchlets above them, rarely at the same time also terminal; calyx wide-ovate, nearly  $1\frac{1}{2}$  lin. long, tapering in a slender pedicel-like base up to nearly a line long; limb obsoletely and broadly 4-toothed, soon turning truncate; filaments slender, but rather short, glabrous; berries almost globular, the size of a small pea, sappy, bluish black, crowned by the truncate cup-shaped calyx-limb, 1-seeded.

HAB.—Not unfrequent in the tropical forests of Martaban, east of Tounghoo; also Chittagong, Tipperah hills.—Fl. March-Apr.—s.—SS.—Metam.

REMARKS.—Sap-wood pale-coloured; heart-wood brownish.

20. *E. rubens*, Roxb.—An evergreen large tree, all parts glabrous, the branchlets white; leaves oblong to oblong-lanceolate, acute at the base, on a strong 2-3 lin. long petiole, bluntish acuminate; 4-6 in. long, entire, chartaceous, glabrous, in drying turning black above and reddish beneath, the lateral nerves thin, but prominent, rather copious, parallel, with faint net-veination, anastomosing near the margin; flowers rather small, white, sessile, with a narrowed calyx-base, usually by threes, forming a brachiate, sessile, and from the base branched or short-peduncled, glabrous, corymbose panicle at the end of the branchlets; calyx obconically cyathiform, about 2 lin. long, tapering in a short, thick, pedicel-like base, smooth; limb deciduously 4-lobed, soon truncate, the lobes orbicular-concave, about  $\frac{1}{2}$  a line long; petals 4, concave-orbicular, 2 lin. long or somewhat longer, free; filaments slender, about 4 to 5 lin. long, glabrous.

HAB.—Forests of Chittagong; Tenasserim, from Moulmein down to Mergui.—Fl. Feb.-Apr.; Fr. begin. of R.S.

21. *E. Thumra*, Roxb.—*Thaw-thabyay*.—An evergreen tree (40—50 + 15—20 + 4—6), all parts glabrous, the branchlets grey; bark roughish, grey,  $\frac{1}{4}$  in. thick; cut brown, dryish; leaves elliptically oblong to oblong and obovate, rarely oval-oblong, acute or acuminate at the base, on a strong 3-4 lin. long petiole, 4-8 in. long, bluntish acuminate or bluntish, entire, firmly coriaceous, glabrous, in drying turning black above and fuscous beneath, the lateral nerves thin but prominent, rather copious, with intervening, parallel and reticulate veins, anastomosing towards the border; flowers rather small, white, sessile, with a thick calyx-base, usually by 3 to 5, forming a sessile or short-peduncled, brachiate, lax and spreading, or more or less contracted, corymbose, glabrous panicle at the end of the branchlets; calyx obconical, about 2 lin. long or longer, smooth tapering into an obscurely pedicel-like base, about half a line long; limb deciduously 4-lobed and soon truncate, the lobes more than  $\frac{1}{2}$  a line long, almost orbicular; petals 4, broader than long, about  $1\frac{1}{2}$  lin. broad, free; filaments rather short, but slender, glabrous; berries (unripe) obovoid, at the base contracted in a  $\frac{1}{2}$  lin. long stalk or sessile, the size of a cherry, glabrous, crowned by the truncate cup-shaped calyx-limb, 1-seeded, the pericarp corky-fleshy.

HAB.—Frequent in the tropical forests of the Pegu Yomah and more so in those of Martaban down to Tenasserim, especially in marshy or inundated places along streams.—Fl. March-Apr.; Fr. May-June.—s.—SS.—Metam.

REMARKS.—Wood heavy, red-brown, close-grained, and rather hard.

22. *E. oblata*, Roxb.—*Thabyay-nee*.—An evergreen tree (40—50 + 12—20 + 4—6), all parts glabrous, the branchlets red-brown; leaves oblong to elliptically-oblong, acute at the base, on a 2-3 lin.

long petiole, rather abruptly bluntish acuminate, 3-5 in. long, thin coriaceous, entire, glabrous, turning fuscous in drying, opaque beneath, the lateral nerves very thin and faint, rather numerous, parallel, anastomosing along the margins, faintly parallel-veined between; flowers rather small, white, sessile, with a pedicel-like calyx-base, usually by threes, forming a rather short, brachiate, shorter or longer peduncled, corymbose, glabrous panicle at the end of the branches and often also sessile in the axils of the leaves; calyx about 2-3 lin. long, smooth, campanulate-cyathiform, narrowed in a line long pedicel-like base, the limb shortly and deciduously 4-lobed and soon truncate, the lobes short, blunt; filaments long and slender, glabrous; berries almost globular, broader than long, the size of a large cherry, smooth, purplish black, crowned by the small cup-shaped or occasionally incurvedly lobed calyx-limb, 1-seeded, the pericarp rather thick, corky-fleshy.

HAB.—Frequent in the tropical forests, especially along marshy choungs, from Martaban down to Tenasserim.—Fl. March-May; Fr. June-Aug.—s.—SS.= Metam.

\* \* *Calyx usually with a circular or 4-angular intrastaminal ring, or the stamens on the thickened ring itself, the limb conspicuously 4-lobed, persistent. Flowers often conspicuous. Berries usually large, more or less turbinate or ovoid, the endocarp thick and fleshy. Seeds large, few or solitary, and usually accompanied by abortive ones.*

○ *Calyx-lobes in fruit spreading.*

23. *E. grandis*, Wight; Bedd. Sylv. Madr. 107.—*Toung-thabyay*, or *thabyay-kyee*.—An evergreen tree (50—60+18—24+4—6), all parts glabrous; branchlets red-brown; leaves more or less broadly to ovate-elliptical, acute or blunt at the base, on a strong petiole about  $\frac{1}{2}$  in. long, bluntish apiculate or rarely shortly bluntish acuminate, entire, firmly coriaceous, glabrous, glossy, 4-6 in. long, the lateral nerves thin but prominent, rather numerous, parallel and slightly curved, anastomosing towards the margin, laxly veined between; flowers middling sized, white, sessile, with a contracted calyx-base, clustered by 3 or more, forming robust and rather short, glabrous, brachiate, corymbose panicles either solitary or often by twos in the axils of the upper leaves and terminal; calyx smooth, about 3 lin. long or longer, hemispherical, with a contracted, thick, pedicel-like,  $1\frac{1}{2}$ -2 lin. long base, the limb 4-lobed, 2 of the lobes petal-like, concave-orbicular, about 2 lin. long, the alternating 2 very short, rounded; petals 4, concave-orbicular, as large as the larger calyx-lobes or somewhat longer; filaments long, glabrous; berries obovoid-pear-shaped, about an inch long or somewhat longer, smooth, crowned by the cup-shaped, truncate (or the lobes often longer persistent), conspicuously scarred calyx-limb, usually 1-seeded

Var. 2. *lepidocarpa* (*E. lepidocarpa*, Wall.): leaves doubly smaller, more decurrent at the base, more oboval, the lateral nerves anastomosing nearer to the margin, usually fuscous-blackish beneath.

HAB.—Frequent in the tropical, and occasionally in the moister upper mixed forests of the Pegu Yomah, Martaban, and Tenasserim; var. 2: in the Eng forests of Upper Tenasserim.—Fl. Feb.; Fr. Apr.—s.—SS.—S. S. Metam.

REMARKS.—Wood heavy, brown, hard and brittle, close-grained.

24. *E. pachyphylla*, Kz.—An evergreen tree, all parts glabrous, the branchlets white; leaves obovate to obovate-oblong, more or less cuneate-acuminate at the base, on a strong petiole 3-4 lin. long, bluntnish or blunt-apiculate, 3-4 in. long, entire, firmly coriaceous, glabrous, turning fuscous in drying, the lateral nerves thin but prominent, rather distant and somewhat irregularly parallel, anastomosing towards the margin, the intervening net-veination thin and lax and rather obsolete; flowers middling sized, usually solitary or by threes, sessile, forming a very short, thick, trichotomous panicle at the end of the branchlets, the peduncle and the ramifications very short ( $\frac{1}{2}$ -1 in. long), very thick and joint-like, 4-gonous; calyx about 4 lin. long, obconical, tapering at the base, smooth, the limb 4-lobed, the lobes about 2 lin. long, rounded, persistent; petals, etc., unknown.

HAB.—Upper Tenasserim, Bithoko range, at 3,000 ft. elevation.—Fl. Apr.

25. *E. tristis*, Kz.—An evergreen tree, all parts glabrous, the branchlets terete, thick, pale brown; leaves elliptical to elliptically obovate, acute at the base, on a thick petiole  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, blunt-apiculate, coriaceous, entire, 4-5 in. long, glabrous, opaque, the lateral nerves rather strong and prominent, rather distant and somewhat irregular with intervening longitudinal thin veins and rather lax net-veination; flowers unknown; panicle corymb-like, sessile, terminal, glabrous, the ramifications rather short and robust; berries on a thick 1-2 lin. long peduncle, depressed-globose, the size of a cherry, glabrous, crowned by the disk-like spreadingly 4-lobed calyx-limb, 2- or 1-seeded, the endocarp thin, fleshy; calyx-lobes in fruit about  $1\frac{1}{2}$  lin. long, rounded.

HAB.—In the Eng forests of Tenasserim.—Fr. Apr.

26. *E. lanceæfolia*, Roxb.—An evergreen very large tree, all parts glabrous; leaves oblong- to broadly-lanceolate, rounded or obtuse at the base, on a  $\frac{1}{4}$ - $\frac{1}{2}$  in. long petiole, long but bluntnish acuminate, 2-3 in. long, entire, rigidly and thinly coriaceous, glabrous, pale-coloured beneath, the lateral nerves thin, but prominent, rather distant and arcuately anastomosing, laxly and transversely veined; flowers rather small, white, sessile, with a pedicel-like calyx-base, usually by 3-5, forming a short, corymbose, brachiate-branched

sessile or almost sessile panicle in the axils of the leaves or above their scars; calyx about 2 lin. long, smooth, contracted in a thick pedicel-like  $1\frac{1}{2}$  lin. long base, the limb 4-lobed, the lobes about  $\frac{1}{2}$  lin. long, rounded; petals 4, concave-rounded, free, nearly 2 lin. long; filaments very long, glabrous; berries ovoid-oblong, about  $\frac{1}{2}$  an in. long, bluish black, smooth, crowned by the 4-lobed inflexed calyx-limb, 1-seeded.

HAB.—Chittagong.—Fl. Nov.; Fr. Feb.

27. *E. Kurzii*, Duthie (*E. cerasiflora*, Kz.).—An evergreen tree (90—100 + 50—60 + 8—10), all parts glabrous, the branchlets whitish, compressed-terete; bark about  $\frac{1}{4}$  in. thick, whitish grey, uneven; cut brown; leaves more or less broadly lanceolate, acuminate or acute at the base, on an  $\frac{1}{3}$ – $\frac{2}{3}$  in. long petiole, bluntish acuminate or sometimes blunt-apiculate, 4–7 in. long, entire, chartaceous, glabrous, opaque, pale-coloured beneath, the lateral nerves rather numerous, but irregularly parallel, often somewhat curved, thin, but prominent, anastomosing towards the margin, the transverse venation thin and obsolete; flowers rather small, white, on slender 2–4 lin. long pedicels, forming a short, but slender, glabrous, simple raceme arising from above the scars of the fallen leaves and also often from the leaf-axils themselves; proper calyx about 3 lin. long or a little longer, clavate-turbinate, and narrowed in a more or less slender pedicel-like base of  $\frac{1}{2}$  to 2 lin. long, smooth, the limb persistent, 4-lobed, the lobes semi-orbicular, nearly 2 lin. long, 2 of them somewhat smaller; petals about  $\frac{1}{3}$  in. long, concave-orbicular, free; filaments long, slender; berries globular, or occasionally somewhat didymous-globular, the size of a pea, contracted into a long slender stalk, smooth, crowned with the diskoid spreadingly lobed calyx-limb, 1–2-seeded.

HAB.—Not rare in the tropical forests of Martaban east of Tounghoo.—Fl. March.—s.—SS.—Metam.

REMARKS.—Wood heavy, brown, hard, unequally fibrous.

28. *E. albiflora*, Duthie.—An evergreen tree, all parts quite glabrous, the branchlets grey; leaves elliptical to obovate, acuminate at both ends, narrowed into a rather strong petiole about 3–4 lin. long, coriaceous, 3–4 in. long, the lateral nerves irregular, arcuate and little prominent, the net-venation lax and thin; flowers white, usually by threes, on slender pedicels 2–3 lin. long and sometimes elongated to  $\frac{1}{2}$  in. in length, forming a corymb-like, axillary, sessile, glabrous panicle slenderly branched from the base and much shorter than the leaves; calyx clavate-narrowed in a stalk, about 2 lin. long or somewhat longer, the teeth conspicuous,  $\frac{1}{2}$  lin. long, oval, bluntish.

HAB.—Burma, probably Ava.

29. *E. formosa*, Wall.—An evergreen large tree, all parts glabrous, the branchlets almost terete, pale-coloured; leaves usually large, ovate-oblong to oblong, rounded or almost cordate at the base, on a strong and very short petiole or almost sessile (the upper ones usually whorled by threes),  $\frac{1}{2}$  to  $1\frac{1}{2}$  feet long, acuminate, entire, coriaceous, glabrous, pale-coloured and opaque beneath, the lateral nerves numerous and somewhat curved, slightly arcuate-anastomosing towards the margin, laxly and faintly net-veined between; flowers large, pale rose-coloured, solitary or by threes, on a  $\frac{1}{2}$ – $\frac{1}{2}$  in. long pedicel, narrowly 2-bracteolate at the apex, forming a short, simple or corymb-like, glabrous raceme at the end of the branchlets or arising laterally from above the scars of the fallen leaves; calyx about  $\frac{3}{4}$  to  $\frac{3}{4}$  in. long, smooth, clavate-turbinate, the limb 4-lobed, persistent, the lobes broad, rounded, 2 of them much larger, about  $\frac{1}{2}$  an in. broad by 4 lin. long; petals about  $\frac{1}{2}$  an in. long, almost orbicular, free; filaments very long, glabrous; berries the size of a small apple, almost globose, contracted in a very short stalk at the base, white, smooth and glossy, crowned by the spreading calyx-lobes, 2-celled, with a large seed in each cell, the endocarp rather thin, insipid-fleshy.

HAB.—In the tropical forests of Chittagong and Upper Tenasserim.—Fl. Fr. March.

REMARKS.—Wood heavy, uniformly brown, close-grained, takes a fine polish.

○○ *Calyx-lobes in fruit incurved or inflexed.*

30. *E. macrocarpa*, Roxb.—An evergreen tree (25–30 + 8–12 + 2–3), all parts glabrous, the branchlets brown, compressed; bark smooth, grey, 2 lin. thick; cut pale-coloured; leaves more or less oblong, rounded or almost cordate at the base, on a thick petiole 2–4 lin. long, shortly but sharply acuminate,  $\frac{2}{3}$  to  $1\frac{1}{4}$  feet long, thin coriaceous, entire, glabrous, rather opaque, the lateral nerves numerous and rather crowded, but rather irregularly parallel, thin but prominent, uniting towards the margin in a thin prominent marginal nerve; flowers large, pale rose-coloured or white, solitary or by threes, on a very short nipple-shaped pedicel, forming a short, simple or more usually corymb-like, sessile or almost sessile, glabrous raceme at the end of the branches; calyx 1– $1\frac{1}{4}$  in. long, clavate-turbinate, much narrowed at the base, smooth (in a dried state almost sulcate), the persistent limb 4-lobed, the lobes semi-orbicular, rounded, 2 of them a little larger and nearly  $\frac{1}{2}$  in. long; petals 4, free, about an inch broad, reniform-orbicular, with a very broad base; filaments long and slender, glabrous; berries the size of an orange, almost globose, smooth, brown, several-seeded, crowned by the spreading calyx-lobes, the endocarp rather thin, fleshy, edible.

HAB.—Frequent along choungs in the tropical forests of the eastern slopes of the Pegu Yomah and Martaban down to Tenasserim, up to 2,000 feet elevation.—Fl. March-Apr. ; Fr. Aug.—s.—SS.—*Metam.* SiS.

REMARKS.—Wood rather heavy, fibrous, but close-grained, pale brown.

31. *E. amplexicaulis*, Roxb.—An evergreen stately tree, with a tolerably straight trunk soon dividing, all parts glabrous; bark of woody parts brown; leaves oval-oblong, almost stem-clasping, rounded at both ends, firm and glossy, 6 to 8 in. long by 3-4 broad, the lateral nerves rather distant, not numerous, curved and areuately anastomosing towards the margin; flowers large, white, sessile with a contracted calyx-base, by threes, on a very short peduncle, forming a short, small, stiff corymb laterally arising from above the scars of the fallen leaves; peduncle and ramifications very short and thick, joint-like; calyx turbinate, about  $\frac{1}{2}$  an in. long, smooth, contracted in a short pedicel-like base, the limb 4-lobed, persistent, the lobes rounded, 2 of them larger and about 3 lin. long; petals 4, free, obovate-orbicular, nearly  $\frac{1}{2}$  an in. long; filaments long and slender, glabrous; berry globular, the size of a small apple, greenish yellow when ripe, crowned by the inflexed calyx-lobes, 1- or 2-seeded, the endocarp soft and rather spongy.—(Descript. from Roxburgh's Fl. Ind. and his MS. drawings.)

HAB.—Chittagong.

32. *E. Malaccensis*, L.—*Thabyoo-thabyay*.—An evergreen tree, 30 to 40 ft. high, all parts glabrous, the branchlets compressed-terete, pale-brown; leaves oblong-lanceolate to almost obovate-lanceolate, acuminate at the base, on a  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, strong petiole, acuminate, 6-8 in. long, chartaceous, entire, glabrous, opaque, the lateral nerves rather numerous, thin but prominent, irregularly parallel and almost curved, anastomosing towards the margin, indistinctly and laxly net-veined between; flowers large, purple, sessile, on a very shortened peduncle and appearing almost clustered; calyx about  $\frac{1}{2}$  an in. long, clavate-turbinate, smooth, narrowed at the base, the persistent limb 4-lobed, the lobes semi-orbicular, the 2 larger ones about 3 lin. broad or somewhat broader; petals 4, free, almost reniform-orbicular with a broad base, about  $\frac{1}{2}$  in. long; berries about the size of a hen's egg, obversely ovoid-turbinate to elliptically-ovoid, smooth and glossy, from pale rose-coloured to dark purple, crowned by the inflexed calyx-lobes, usually 1-seeded, the endocarp thick and fleshy, edible.

HAB.—Cultivated in native gardens of Tenasserim.—Fl. H.S.

33. *E. polypetala*, Wall.—An evergreen tree (20—30 + 4—6 + 3—4), all parts glabrous, the branchlets whitish and scared; leaves often whorled by 3 or 4, or opposite or nearly so, linear to linear-lanceolate, acuminate or obtuse at the base, on a thick hardly a

line long petiole, 3-4 in. long, bluntish acuminate, entire, glabrous, thin coriaceous, opaque, the lateral nerves thin but prominent, rather distant, anastomosing towards the margin, thinly veined between; flowers rather large, white, on slender  $\frac{1}{2}$ -1 $\frac{1}{2}$  in. long at the apex minutely 2-bracteoid pedicels, forming a simple corymb or a short, glabrous, short-peduncled, corymb-like raceme arising solitary from above the scars of the fallen leaves; calyx obconically turbinate, about  $\frac{1}{2}$  in. long, smooth, clavate-contracted at the base, the limb 4-lobed, the lobes persistent, 2 of them very much larger and broader, about 2 lin. long by 4 broad, rounded; petals 4-16, broader than long, free; filaments long and slender, glabrous.

HAB.—Chittagong.—Fl. March-Apr.; Fr. June and July.

34. *E. aquea*, Burm.; Bedd. Sylv. Mndr. 109.—An evergreen tree (20—30 + 10—12 + 2—3), all parts glabrous, the branchlets white or pale-coloured, sharply and often wingedly 4-angular or terete or nearly so; leaves variable, those of the shoots often elongate oblong-linear, up to a foot long and of a thinner texture, the older ones oblong to ovate-oblong, rounded or almost cordate at the usually narrowed base, on a very thick about a line long petiole,  $\frac{1}{2}$ -1 ft. long, longer or shorter bluntish acuminate, entire, chartaceous to coriaceous, glabrous, the lateral nerves thin but prominent, somewhat irregularly parallel and rather copious, at about 1-2 $\frac{1}{2}$  lin. from the margin united into a continuous marginal nerve as strong as the nerves themselves; flowers large, white, on a short  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long pedicel, solitary or by threes, forming a short, simple or almost corymb-like, glabrous raceme at the end of the branches or occasionally in the axils of the leaves; calyx about  $\frac{1}{2}$ - $\frac{3}{4}$  in. long, turbinate-clavate, smooth, the limb 4-lobed, the lobes persistent, twice as broad as long, blunt, 2 of them larger, about 5 lin. broad; petals 4, broader than long, rounded, free; filaments long and slender, glabrous; berries depressed-turbinate-pear-shaped, smooth and glossy, pale rose-coloured or white, the size of a wood-apple, 1-4-seeded, with several abortive seeds, crowned by the inflexed carnescent calyx-lobes, the endocarp spongy-fleshy, thick, edible.

HAB.—Apparently only cultivated all over Burma from Chittagong and Martaban down to Tenasserim.—Fl. March-Apr.; Fr. May-June.

35. *E. Javanica*, Lamk.—An evergreen tree (25—30 + 10—12 + 3—4), all parts glabrous, the branchlets terete and brown; leaves from ovate-oblong to oblong-lanceolate, rounded to almost cordate at the base, on a short petiole up to a line long or almost sessile, bluntish to bluntish acuminate, 4-6 in. long, entire, thin coriaceous, glabrous, the lateral nerves thin and rather faint, rather copious and somewhat irregularly parallel, faintly anastomosing towards

the margin; flowers large, white, either solitary on a slender peduncle or usually by 2 or 3, sessile, with a pedicel-like base or really shortly jointed-pedicelled, forming a lax, rather short, glabrous, often corymb-like raceme at the end of the branches or laterally from above the scars of the fallen leaves; calyx clavate-turbinate, narrowed into a short pedicel-like base, smooth, about  $\frac{1}{3}$ - $\frac{1}{2}$  in. long, the limb persistently 4-lobed, the lobes broader than long, rounded, 2 of them somewhat larger and about 3 lin. broad; petals 4, free, obovate-orbicular, about  $\frac{1}{3}$  in. long or longer; filaments long and slender, glabrous; berries depressed-turbinate, contracted in a very short stalk, the size of a cherry to that of a wood-apple, white, glossy and smooth, crowned by the carnescent incurved calyx-lobes, usually 1- or few-seeded, the endocarp spongy-fleshy, thick, edible.

HAB.—Frequent in the evergreen coast-forests of the Andamans.—Fl. March-Apr.; Fr. May-June.—s. S.S. = Aren. SiS.

36. *E. Jambos*, L.; Brand. For. Fl. 233.—An evergreen tree (20—30 + 3—5 + 3—4), all parts glabrous, the branchlets more or less 4-cornered, pale brown; leaves lanceolate, acute at the base, on a strong petiole 2-3 lin. long, bluntish and rather long acuminate, 4-6 in. long, coriaceous, glabrous, the lateral nerves thin but prominent, rather copious and irregularly parallel, laxly and thinly net-veined between; flowers large, white, on about  $\frac{1}{2}$  in. long or somewhat shorter pedicels, forming a short, glabrous, simple corymb-like raceme at the end of the branchlets; calyx about  $\frac{1}{2}$  an in. long or longer, clavate-turbinate, smooth, clavately narrowed at the base, the limb 4-lobed, the lobes almost equal, broad, rounded, about 2-3 lin. long, persistent; petals 4, obovate-orbicular, about  $\frac{1}{2}$  an in. long, free; filaments very long, glabrous; berries almost globular or ovoid, dull yellow, smooth, thick-fleshy, edible, crowned by the inflexed calyx-lobes, 1- or 2-seeded.

HAB.—Frequently cultivated in native gardens all over Burma.—Fl. May-July; Fr. C.S.

### BARRINGTONIA, Forst.

Calyx-tube ovoid or turbinate, not or hardly produced beyond the ovary, the limb valvately rupturing into 2-4 lobes, or 3-4- (very rarely 5-) cleft, with the lobes imbricate in bud. Petals 4, rarely 5, at the base adnate to the staminal cup. Stamens indefinite, in several rows, at the base united in a cup or ring, all bearing anthers; filaments filiform; anthers versatile or almost basifix. Disk annular. Ovary inferior, 2-4-celled, with 2 to 8 suspended or horizontal superposed ovules in each cell arranged in 2 rows; style filiform with a small stigma. Berry fibrous-fleshy, terete or angular, crowned by the calyx-limb, by abortion usually 1-seeded.

Embryo thick and fleshy, entire, consisting of a woody rind and a medullary stratum.—Trees, with alternate, penninerved, not dotted leaves. Flowers usually large, in terminal or lateral racemes or spikes. Bracts very deciduous, usually small.

\* *Calyx in bud closed, entire, valvately rupturing in 2-4 lobes. Flowers pedicelled.*

× *Fruit with appendages, angular.*

Flowers about 3 in. in diameter or larger, in corymb-like, short, erect racemes; leaves entire, sessile . . . . . *B. speciosa*.

Flowers about an in. in diameter, in long, slender, pendulous racemes; leaves crenulate, very shortly petioled . . . . . *B. racemosa*.

× × *Fruit conically pyramidal, with short wing-like appendages at the base.*

Leaves crenulate; racemes rather erect, puberulous . . . . . *B. conoidea*.

\* \* *Calyx already in bud 3-4-cleft, the lobes imbricate.*

× *Flower pedicelled; rachis of raceme slender; fruits sharply 4-cornered.*

Glabrous or slightly pubescent; flowers red, rather small; leaves crenulate, short petioled . . . . . *B. acutangula*.

× × *Flowers sessile, the rachis of the spike very thick and almost fleshy.*

+ *Calyx-tube winged; fruits narrowly winged along the corners.*

Leaves blunt or acute at the base, not decurrent; calyx-lobes rounded, 2 lin. long . . . . . *B. angusta*.

Leaves long-decurrent and acuminate at the base; calyx-lobes 8-angular-ovate, more or less acute, more than 3 lin. long . . . . . *B. pterocarpa*.

+ + *Calyx-tube not winged (fruits unknown).*

Leaves entire, elongate, long-petioled . . . . . *B. macrosiachya*.

Leaves elongate, long-petioled; flowers pedicelled; calyx terete . . . . . *B. pendula*.

1. *B. speciosa*, L.f.; Bedd. Sylv. Madr. 112.—*Kyè-kyee*.—An evergreen tree (30—50 + 6—15 + 4—8), all parts glabrous; leaves large, obovate-cuneate, sessile, with a narrowed rounded base, blunt to almost retuse, 1-2 ft. long, thick membranous or thin coriaceous, entire, glabrous and glossy; flowers conspicuous, up to 3 in. in diameter, white, on a 1-2 in. long pedicel, forming a shorter or longer terminal corymb-like raceme furnished with diminutive floral leaves passing into bracts; calyx-limb valvately 2-3-cleft, the lobes concave-elliptical, veined; petals about 1½ in. long; ovary 4-celled, 2 of the dissepiments often imperfect in the middle; fruit as large as the fist, turbinate-pyramidal, 4-angular, fibrous-fleshy, the endocarp putamen-like.

HAB.—Frequent along the sea-shore of the Andamans.

2. *B. racemosa*, DC.; Bedd. Sylv. Madr. 112.—*Kyee-pen*.—An evergreen tree (40—50 + 20—25 + 4—5), all parts glabrous; leaves more or less cuneate-oblong to cuneate-lanceolate, rounded or obtuse at the narrowed base, on a short petiole 2-3 lin. long, shortly acuminate, crenulate, chartaceous, 4-8 in. long, glabrous; flowers conspicuous, white or pale rose-coloured, on slender 2 to 3 lin. long pedicels, forming a long, pendulous, quite glabrous, slender raceme

arising laterally from the end of the branchlets; calyx-tube turbinate, obsoletely 4-angular, quite smooth, the limb valvately rupturing into 2 or 3 concave, blunt, smooth lobes more than  $\frac{1}{4}$  in. long; petals ovate-oblong; fruit fibrous-fleshy, ovoid-oblong, 4-cornered, about  $1\frac{1}{2}$  in. long, crowned by the calyx-limb, 1-seeded.

HAB.—Frequent in the evergreen coast forests of the Andamans.—Fl. Apr.; Fr. May-June.—s.—SS.—SiS. Chloritic rocks, etc.

3. *B. conoidea*, Griff.—An evergreen shrub or small tree, all parts glabrous; leaves more or less cuneate-oblong, rounded or cordate at the narrowed base, acute or shortly acuminate, on a thick 1-2 lin. long petiole, 6-8 in. long, crenate-serrulate, chartaceous, glabrous; flowers conspicuous, on slender about  $\frac{1}{2}$  an inch long pedicels, forming a rather short, erect, somewhat puberulous raceme arising laterally or from the end of the branchlets; calyx-tube about 2 lin. long, obsoletely pulverulent, conical, at the base produced into 8 thickened protuberances, the limb valvately rupturing into 2 concave-oblong, acute,  $\frac{1}{3}$ - $\frac{2}{3}$  in. long lobes; petals ovate-lanceolate, berries fibrous-fleshy, conoid, the size of a hen's egg, crowned by the calyx-limb, at the base produced into 8 wing-like semicordate processes (or all or the one or other of these expanded into larger, recurved, oblong, fleshy wings?), 1-seeded.

HAB.—Coast forests of Upper Tenasserim.—Fl. Apr.

4. *B. acutangula*, Gaertn.; Bedd. Sylv. Madr. t. 204; Brand. For. Fl. 235.—*Kyay-nce*.—An evergreen tree (10—50 + 10—25 + 5—6), all parts glabrous or the shoots and under-surface of leaves puberulous; bark dark brown, rough, thick; leaves obovate to obovate-oblong, acuminate to almost cuneate-acuminate at the base, on a short puberulous or glabrous petiole 1-2 lin. long, apiculate or blunt to rounded at the apex, crenate-serrulate, chartaceous, 2-3 in. long, glabrous, or usually minutely greyish pubescent beneath, conspicuously net-veined and pale coloured beneath; flowers rather small, but conspicuous by the long red filaments, on rather slender about a line long pedicels, forming a slender, long, puberulous, soon glabrescent raceme at the end of the branchlets; calyx glabrous, the tube short, sharply 4-cornered, the limb 4-lobed, the lobes almost semiorbicular to oblong and blunt, about a line long or somewhat longer; petals 4, oblong, flesh-coloured, about 3 lin. long; fruits oblong, up to  $1\frac{1}{2}$  in. long, sharply 4-cornered, glabrous, crowned by the small calyx-limb, 1-seeded.

HAB.—Common in the mixed, especially the lower and savannah, and swamp forests all over Burma from Chittagong and Ava down to Tenasserim; prefers swampy localities.—Fl. Apr.-May; Fr. June and July.—l x s.—SS.—SiS.

All.

REMARKS.—Wood red-brown, hard, fine-grained, used in constructing carts; bark good for tanning.

5. *B. pterocarpa*, Kz.—*Kyð-tha*.—An evergreen tree (30—50 + 12—20 + 4—6), all parts glabrous; leaves elongate ovate-lanceolate, long cuneate-acuminate at the base and decurrent on the longer (up to  $\frac{1}{2}$  in. long) or shorter petiole, shortly acuminate, 1-1 $\frac{1}{2}$  ft. long, crenulate-serrate towards the apex, thin coriaceous, glabrous; flowers conspicuous, white or rose-coloured (the filaments white), sessile, forming a very long, pendulous, thick-spindled, pulverulent spike at the end of the branchlets furnished at the base with reduced lanceolate crowded floral leaves; calyx velvety, the tube about a line long or longer, wingedly 4-cornered, the limb 4-cleft, the lobes triangular-ovate, acute or bluntish, more than 3 lin. long; petals  $\frac{3}{4}$  in. long, ovate-oblong, acute; fruits oblong, fibrous-fleshy, about 2 in. long, 4-cornered, the angles narrowly and thick-winged.

HAB.—Not unfrequent in the tropical forests of the eastern slopes of the Pegu Yomah, and more so in those of Martaban.—Fl. March-April; Fr. June.—SS.—SiS. Metam. Lat. p.

6. *B. augusta*, Kz.—An evergreen middling-sized tree, all parts glabrous; leaves cuneate-oblong to ovate-cuneate, obtuse or acute at the base, on a thick petiole 3-4 lin. long, acute or shortly acuminate,  $\frac{1}{2}$ -1 $\frac{1}{4}$  ft. long, crenulate-serrate, almost entire towards the narrowed base, chartaceous, glabrous; flowers conspicuous, sessile, forming a very long, thick-spindled, tawny puberulous spike at the end of the branchlets furnished at its base with numerous crowded lanceolate reduced leaflets; calyx velvety, the tube about a line long or longer, wingedly 4-cornered, the limb 4-cleft, the lobes rotundate, 2 lin. long; fruits (unripe) fibrous-fleshy, oblong, tawny pulverulent, crowned by the calyx-limb, 4-winged, the wings fleshy and thick, rather narrow, waved.

HAB.—Upper Tenasserim.—Fl. Feb.

7. *B. macrostachya*, Kz.—An evergreen small tree, all parts glabrous, the bark grey; leaves elongate-oblong-lanceolate to obovate-oblong, long-acuminate at the base, on a rather slender petiole an inch long or longer, shortly acuminate or apiculate, entire, 1-1 $\frac{1}{4}$  ft. long, chartaceous, glabrous; flowers conspicuous, purplish red, with white, long filaments, sessile, forming lateral, long, pendulous, thick, cylindrical, somewhat pulverulent spikes; calyx-tube about 3 lin. long, obconical, 4-cornered, the limb valvately 4-lobed, the lobes about 2 lin. long, rounded and blunt, pulverulent outside; petals ovate, blunt; fruit (accord. Jack) a berry or apple.

HAB.—Forests of Southern Tenasserim.

8. *B. pendula*, Kz.—A small tree; leaves lanceolate-oblong, narrowed at both ends, long-petioled, one foot long or longer,

almost serrulate; spikes up to  $2\frac{1}{2}$  ft. long, arising from the older branches, sulcate, densely flowered; flowers large; calyx almost obovate, the limb 4-cleft, the lobes rotundate, erect, persistent; 4-celled.—(After Griffith.)

HAB.—Tenasserim.

### CAREYA, Roxb.

Calyx-tube thick, ovoid or turbinate, not produced beyond the ovary, the limb deeply 4- or 5-lobed. Petals 4, or rarely 5. Stamens numerous, in several series, quite free, the outermost longer ones or the innermost shorter ones or both reduced to filiform stamens, the median ones or nearly all perfect; anthers small. Ovary inferior, 4- or rarely 5-celled, with several ovules in 2 to 6 rows in each cell; style elongate, with a somewhat capitate or slightly 4-lobed stigma. Fruit globose, fleshy, crowded by the calyx-limb, many-seeded. Seeds funicled, irregularly scattered and enveloped in a fleshy pulp. Embryo entire; cotyledons none.—Trees or rarely undershrubs, with alternate, not dotted leaves, often crowded. Flowers large and showy, in short interrupted spikes or racemes.

\* *Flowers on long pedicels.*

Undershrub; berry only an inch thick; seeds about 3 lin. long . *C. herbacea.*

\* \* *Flowers sessile. Trees.*

Petals blunt or rounded at apex, concave; ovules in 2 rows in each cell . *C. arborea.*

Petals acute, the borders revolute. Ovules in 6 rows in each cell . *C. spherica.*

1. *C. arborea*, Roxb.; Bedd. Sylv. Madr. t. 205 and Anal. t. 19, f. 2.; Brand. For. Fl. 236.—*Ban-bway*.—A tree (50—60 + 12—20 + 5—8), remaining stunted in sterile grounds, shedding leaves during H.S., all parts glabrous; leaves obovate, while young sessile with a decurrent base, afterwards shortly and thick-petioled, shortly apiculate;  $\frac{1}{2}$ –1 ft. long, crenate-serrulate, chartaceous, glabrous; flowers large, nearly  $2\frac{1}{2}$  in. in diameter, white, with purple filaments, sessile, each supported by 3 unequal bracts and forming a short almost cluster-like spike at the end of the branches; calyx pruinous, the tube hemispherically ovoid, nearly  $\frac{1}{2}$  an inch long, the lobes  $\frac{1}{4}$  in. long, leathery, rounded; petals oblong, concave (not revolute),  $1\frac{1}{4}$  in. long, rounded or blunt; outer series of stamens much longer and reduced to filaments, the median ones fertile, the innermost ones much shorter and converging; ovary-cells with only 2 vertical rows of seeds; berry ovoid or globose, the size of a large apple, smooth, crowned by the calyx-limb; seeds oblong, somewhat compressed,  $\frac{1}{2}$  in. long, the testa pale brown, thin coriaceous, smooth.

HAB.—Common in all leaf-shedding forests, especially in the open, dry, lower mixed and savannah forests, all over Burma from Pegu and Martaban down to Tenasserim.—Fl. Apr.–May; Fr. June–July–1.—SS.=∞.

REMARKS.—Wood heavy, red-brown, close and even-grained, tough, strong and durable, takes fine polish. W =  $\square'$  = 55 pd. Used for gun-stocks, house-posts, planks, cart-framing, &c. Also good for furniture and cabinet-working, but too heavy. Bark used for tanning.

2. *C. sphaerica*, Roxb.—A leaf-shedding large tree; leaves broadly obovate, cuneate-acuminate at the base, shortly petioled,  $\frac{1}{2}$ –1 ft. long, apiculate, blunt or almost retuse, obsoletely crenate, chartaceous, glabrous; flowers white, with the outer filaments purple, large, up to  $2\frac{1}{2}$  in. across, sessile, each supported by 3 rather large bracts and forming a short cluster-like spike at the end of the thick often reduced branches; calyx pruinous, the tube about  $\frac{1}{2}$  in. long, hemispherical, the limb 4- rarely 5-cleft, the lobes only 2 lin. long, rounded, thick; petals 4, rarely 5, oblong-lanceolate,  $1\frac{1}{4}$  in. long, bluntish, but appearing acute through the revolution of their margins; outer stamens much longer, reduced to filaments, median ones fertile, innermost ones short, sterile and converging; ovary-cells with 6 vertical rows of ovules; berry spherical, the size of an orange, fibrous-fleshy, smooth, crowned by the calyx-limb; seeds oblong, pale brown, somewhat compressed, smooth, about  $\frac{1}{2}$  in. long.

HAB.—Mountains of Chittagong.—Fl. Apr.; Fr. July.

## PLANCHONIA, Bl.

Calyx-tube turbinate, hardly or not produced beyond the ovary, the limb 4-cleft, imbricate in bud. Petals 4. Stamens numerous, in many rows, united at the base in a ring or short cup, the innermost series without anthers. Ovary crowned with an epigynous ring surrounding the style, 3-4-celled, with numerous ovules in 2 rows in each cell; style filiform with a blunt cruciately depressed stigma. Berry corticate, crowned by the calyx-limb, 3-4-celled. Seeds several in each cell, long-funicled. Albumen none. Embryo circinate, the cotyledons short, foliaceous, folded, the radicle very long, clavate, spirally convolute.—Trees, with alternate or crowded, not dotted leaves. Flowers rather small, 3-bracted at the base, in very short terminal racemes.

1. *P. valida*, Bl.—*Ban-bway*.—An evergreen tree (40–60 + 15–20 + 4–10), all parts glabrous; leaves obovate to elliptically oblong, at the sinuate-acute base decurrent on the broad petiole of variable length ( $\frac{1}{4}$ – $\frac{3}{4}$  in.), thick chartaceous or thin coriaceous, 3-7 in. long, crenulate-serrate, glabrous, much and laxly net-veined, glossy, especially beneath; flowers middling sized, greenish, on very short thick pedicels, forming a short terminal raceme; calyx almost turbinate, obsoletely 8-cornered, about  $\frac{1}{4}$  in. long, the lobes as long,

almost semi-orbicular; petals reflexed, about an inch long, blunt; filaments purple, twisted,  $1\frac{1}{2}$  in. long.

HAB.—Frequent in the evergreen coast-forests of the Andamans.—s.—SS.—SiS.

REMARKS.—Wood brown, close-grained, heavy, the sap-wood lighter coloured.

### MELASTOMACEÆ.

Flowers regular, hermaphrodite. Calyx-tube enclosing the ovary, and either cohering with its angles, leaving intermediate cavities, or entirely free or more or less adnate to it; limb entire or 3-6-lobed or -toothed, usually imbricate in bud. Petals 3-5, rarely 6, imbricate (usually contorted). Stamens usually twice as many, sometimes only as many as petals and inserted with them, the filaments curved down in the bud; anthers 2-celled, opening in 1 or 2 pores at the top or very rarely dehiscing longitudinally, the connective often variously extended or thickened. Ovary enclosed in the calyx-tube and adnate to it, or more or less free, with 2 to 6 or rarely more cells, with the placenta in the axis, or rarely 1-celled by the abortion of the partitions; style simple, with a minute stigma. Ovules several, rarely 2 only to each placenta, anatropous. Fruit enclosed in the calyx or combined with it, a berry or a capsule opening in as many valves as there are cells, usually many- rarely few- or 1-seeded. Albumen none. Embryo straight or curved, the cotyledons plano-convex or thick and variously folded; radicle short.—Herbs or shrubs, very rarely trees, with opposite, simple, 3-11 (very rarely 1-nerved and penninerved) -nerved leaves. Stipules none. Flowers often gay coloured, usually in terminal panicles or clusters, rarely axillary or solitary.

An order of little interest to the forester. Slightly astringent principles prevail, and the numerous species of *Memecyla* furnish welloy dye. The timber, too, of these is very hard, but small. Upwards of 36 species are found in Burma.

\* Anthers opening by 2 or 1 apical pores. Embryo small, terete or nearly globose.

× Ovary more or less adnate to the calyx, the apex free, conical or convex. Connective usually produced beyond the base of the anthers. Seeds cochleate, minute.

Anthers equal; fruit a berry . . . . . *Otanthera*.  
Anthers almost unequal; fruit a berry . . . . . *Melastoma*.

× × Ovary free or more or less adnate to the calyx, the apex free, hemispherical or conical, sometimes carved out. Connective not produced beyond the base of the anther. Seeds minute, never cochleate.

○ Calyx terete and smooth, adnate to the ovary and capsule; anthers 10, equal . . . . . *Ochthocharis*.

○ ○ Calyx ribbed.

Ovary and capsule high-up adnate to the calyx; panicle terminal . *Oryzopora*.

- Ovary and capsule free on the bottom of the calyx; panicle terminal  
 As former, but flowers in axillary clusters . . . . . *Allomorpha*.  
 . . . . . *Anerincleistus*.  
 X X X Ovary wholly or only with its angles adnate to the calyx, the free apex conical or convex. Stamens nearly equal or the alternating ones reduced to curiously-shaped staminodes; anthers usually recurved. Seeds never cochleate.  
 Stamens inserted in the deep grooves between the ovary and calyx; connective at base in front with 2 bristles, lobes, or tubercles.  
 Ovary crowned by 4 crests; panicle terminal . . . . . *Anplectrum*.  
 \* \* \* *Anthers opening by longitudinal slits*.  
 Ovary 4-celled; seeds numerous, minute; embryo minute . . . . . *Pternandra*.  
 Ovary 1-celled; seeds solitary; embryo large . . . . . *Memecylon*.

## OTANTHERA, Bl.

Calyx hirsute or covered with tufted stiff hairs, the tube ovoid; lobes 5 or 6, deciduous, with or without necessary teeth or scales. Stamens twice as many as petals, all equal and conform; anthers oblong-linear or linear-subulate, opening by a single apical pore, the connective not prolonged beyond the anthers, but at the base produced in a short, 2-lobed or 2-spurred appendage turned upon the inner face. Ovary half-inferior, 5-6-celled, crowned with bristles; style thickened upwards, the stigma truncate. Fruiting calyx truncate, the berry 5-or 6-celled, more or less pulpy, irregularly rupturing. Seeds minute, cochleate.—More or less strigose herbs with 3- to 7-nerved leaves. Flowers in terminal trichotomous cymes or panicles.

1. *O. bracteata*, Korth.—An evergreen shrubby plant, the branches 4-cornered and more or less covered with pale-coloured or reddish hairs or bristles; leaves from lanceolate to elliptically ovate, on an appressed bristly petiole 2-4 lin. long, acuminate, entire, membranous, usually 5-nerved, on both sides rough from appressed strigose hairs, 3 to 5 in. long; flowers rather conspicuous, white or pink, on 1-2 lin. long, densely appressed; hispid pedicels, forming a poor terminal very shortly peduncled or almost sessile cyme usually supported by a few bract-like floral leaves; calyx-tube nearly 3 lin. long, more or less densely covered with scales formed of 1 to 5 long, pale or purplish bristles thickened at the base; lobes 5 or 6, linear, hardly as long as the tube, long and bristly ciliate, alternating with as many minute, obtuse, stellately-fringed scales; petals 6-8 lin. long, obovate, terminating in a tuft of long stiff hairs; ovary 4- or 5-celled, the conical apex densely appressed hirsute; fruiting calyx almost globular, with a short, free, truncate tube, bristly, the berry rather dry, as large as a pea, with thick fleshy placentas projecting far into the cells.

HAB.—Not unfrequent in Tenasserim from Moulmein down to Mergui.—Fl. Feb.-July.

# MELASTOMA, L.

Calyx clothed with bristles or scales, the tube bell-shaped or ovoid; lobes 5, rarely 6 or 7, deciduous, alternating with as many inconspicuous accessory lobes or teeth. Petals usually 5. Stamens twice as many as calyx-lobes; anthers linear-subulate, opening by a single apical pore, very unequal, 5 larger with the connective produced below in a long appendage, incurved and 2-lobed or 2-pointed at the insertion of the curved filaments, and 5 smaller with the basal appendage shorter or wanting. Ovary ovoid, free, or more or less adnate, 5- rarely 6- or 7-celled, the apex appressed bristly; style filiform with an obtuse stigma. Fruiting calyx-tube truncate after the fall of the lobes, more or less adnate to the more or less succulent and pulpy irregularly bursting berry. Seeds minute, echinate.—Shrubs or little trees, with 3- or more-nerved leaves. Flowers conspicuous, solitary, or forming poor terminal cymes.

× Leaves more or less appressed bristly hairy or pubescent.

+ Calyx covered with closely appressed, chaffy, scale-like bristles.

Scales of calyx about  $\frac{1}{2}$  lin. long or longer, often rather broad; calyxine lobes shorter, often only half as long as the calyx-tube; leaves usually acute and appressed bristly on both sides *M. malabathricum*.

Scales of calyx up to a line long, chaffy, ciliate or finely cleft; calyx-lobes about as long as the tube, acuminate, the alternating teeth short and subulate; leaves on both sides, or only beneath, appressed pubescent, acuminate *M. normale*.

++ Calyx covered with squarrose scale-like bristles about 2 lin. long and more or less spreading.

Leaves softly appressed-pubescent on both sides *M. Houtteanum*.

×× Leaves glabrous, or only with a few scales on the ribs beneath.

Calyx covered with long, fine, spreading bristles curved upwards; the accessory teeth nearly as long as the calyx-lobes *M. decemfidum*.

1. *M. malabathricum*, L.—*Myet-pyai*.—An evergreen erect branched shrub from 1 to 6 ft. high, sometimes growing out into a little tree, all parts appressed bristly, the bristles on the branches often very rigid and scale-like; leaves on shorter or longer petioles, from ovate-oblong to elliptically oblong, rounded or obtuse at the base, usually 5-nerved (the 2 intra-marginal nerves thin), acute, 3 to 5 in. long, covered by appressed hairs or bristles, which are either rigid and strigose on the upper side and softer beneath, or as often rigid and scale-like on both sides; flowers usually 5-merous, conspicuous, rose-coloured, purple or white, on 3 to 4 lin. long scaly pedicels, forming by 3 to 11 terminal almost sessile cymes; bracts very deciduous, from large and broadly ovate to small and narrow-lanceolate; calyx-tube ovoid-globose, 2 to 3 lin.

long, densely covered with short appressed-chaffy scales, the lobes lanceolate, more or less acuminate, usually shorter than the tube, alternating with the 5 small subulate scales or accessory lobes; petals  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, obovate; connective of the shorter stamens at the base excurrent into 2 lobes; berry enclosed and adnate to the appressed-chaffy calyx, globular, 3 to 4 lin. in diameter; seeds minute, attached to the thick pulpy purple placentas.

HAB.—Frequent all over Burma from Chittagong and Ava down to Tenasserim, especially in shrubby waste places, in savannahs, along river embankments, etc.—Fl. Fr.  $\infty$ .—s.  $\times$  1.—SS. =  $\infty$ .

2. *M. normale*, Don.—An evergreen shrub often growing out into a treelet of 10 to 12 ft. in height, the branches conspicuously rufous-hirsute; leaves from elliptically ovate to linear-oblong, on strigose rather short petioles, acuminate, 3-5 in. long, above covered with appressed, short, rather roughish, stiff hairs, beneath densely and softly pubescent; flowers showy, rose-coloured or white, on short hirsute pedicels, forming small, almost sessile cymes at the end of the branchlets; calyx densely covered with appressed-chaffy ciliate or finely cleft scales up to a line long, the lobes about as long as the calyx-tube, ovate to lanceolate, acuminate, alternating with as many short subulate teeth; petals obovate, about a line long.

HAB.—Frequent in the drier hill forests of Martaban, up to 5000 ft. elevation; Ava hills.—Fl. March-May.—SS.=Metam, Lat.

3. *M. Houtteanum*, Naud.—An evergreen bushy shrub, the branches more or less covered with pale-coloured or brown bristly scales and stiff hairs; leaves on shorter or longer chaffy-scaled petioles, varying from oblong to oblong-lanceolate or almost ovate, rounded at the base, 3-5 in. long, acuminate or acute, entire, appressed-bristly and rough above, beneath usually softly appressed-pubescent and chaffy along the 5 principal nerves; flowers conspicuous, usually 5- occasionally 6-merous, purple or pink, on short appressed scaly pedicels, forming by 3 or more an almost sessile terminal cyme or rarely solitary; bracts at the base of the pedicels varying from oblong to lanceolate, shorter or longer; calyx thickly covered with closely appressed afterwards somewhat spreading, long, chaffy, ciliate, pale-coloured scales of about 2 lin. length; the lobes linear-lanceolate, subulate-acuminate, nearly as long as the calyx-tube, appressed pubescent, alternating with as many short linear accessory teeth terminated by a tuft of bristles; petals obovate, ciliate, bearing a tuft of hairs at the apex, about  $\frac{3}{4}$  to 1 in. long; connective of shorter stamens with 2 basal appendages.

HAB.—Rather rare in the tropical forests along the eastern slopes of the Pegu Yomah; Tenasserim.—Fl. March—s.—SS.=SiS.

## OXYSPORA, DC.

Calyx glabrous, the tube oblong or clavate-bell-shaped, absolutely 4-cornered; lobes 4, short, simple, or augmented on the back with a minute tooth or wing-like appendage. Petals 4. Stamens 8, 4 of which usually smaller, or rarely only 4, dimorphous, the 4 larger ones purple, curved, opening by a single apical pore, rather long, 2-lobed at the base, the smaller ones yellow; connective not produced, without appendages, but usually spurred on the back. Ovary high up adnate with the angles of the calyx, 4-celled, glabrous at the apex; style filiform, with a punctiform stigma. Capsule club-shaped, enclosed in the membranous 8-ribbed calyx, 4-celled. Seeds numerous, minute, unequally cuneate.—Slender, erect or somewhat scandent shrubs, with 5- to 7-nerved leaves. Flowers rather small, forming terminal often drooping lax panicles.

Glabrous; ramifications of panicle 4-cornered or winged; bracts, etc., persistent; connective without appendage or spur . . . . . *O. cernua*.  
Stems and petioles often hairy; panicle-branchings terete; bracts very deciduous; connective on the back side spurred at the base . . . . . *O. vagans*.

1. *O. cernua*, Hf. and Th.—An evergreen scandent shrub, all parts glabrous; leaves from ovate-lanceolate to ovate-oblong, shorter or longer petioled, acuminate, variable in size, the smaller ones 4 to 6, the larger 9 in. to a foot and more long, 5-nerved and regularly transversely parallel-veined, glabrous, pale coloured (in a dried state brown) beneath; flowers middling sized, rose-coloured, 4-merous, slenderly pedicelled, usually by 3-1 and eymulose, forming ample, lax, drooping, glabrous, compound panicles with the branchings and axis 4-cornered, or the latter often narrowly 4-winged towards the base; bracts and bractlets small, but persistent; calyx about 4 lin. long, glabrous, the tube obsoletely ribbed, the limb rather broad, 4-lobed, the lobes broadly ovate, acute; petals nearly  $\frac{1}{2}$  in. long, oblong, acute; stamens 8, the connective without appendages or dorsal spurs; capsule enclosed in the strongly 8-ribbed calyx-tube, about 3 to 4 lin. long, club-shaped, oblong, glabrous.

HAB.—Chittagong.—Fl. Oct.-Nov.; Fr. Feb.-March.

## ALLOMORPHIA, Bl.

Calyx glabrous or sparingly hispid, the tube shortly bell-shaped or cylindrical, angular, the limb dilated, bluntish 4- or 5-toothed and persistent. Petals 4 or 5. Stamens 8 or 10, nearly equal; anthers incurved, 2-lobed at the base, opening by a single apical pore, the connective not produced and often spurred on the back at

the base. Ovary ovoid, almost free or only at the base adnate, situated on the bottom of the calyx, 3-4-celled, depressed on the swollen apex, usually ciliolate on the margin; style filiform, with a minute stigma. Capsule small, ovoid, enclosed in the urceolate 4-8-ribbed calyx-tube, 3-4-valved. Seeds linear-club-shaped.—Branched shrubs or (scapigerous?) perennials with long-petioled 5-9-nerved leaves. Flowers pedicelled, clustered, forming terminal, usually narrow panicles.

Calyx shallowly sinuate-toothed; branches, petioles, and the 9 strong nerves beneath densely brownish bristly. *A. hispida*.  
Calyx lobes with a thick wing-like appendage on the back; all parts glabrous. *A. umbellulata*.

1. *A. hispid*, Kz.—An evergreen undershrub, the branches and the strong 5 in. long petioles covered with tawny, spreading, long, stiff bristles; leaves large, ovate, slightly cordate at the base, long-petioled, shortly acuminate, 8-9 in. long, almost coriaceous, above sparingly, beneath on the veins and especially on the 9 principal nerves more densely, covered with long, brownish, stiff bristles; flowers 4-merous, small, on slender 2-3 lin. long pedicels, clustered, forming a narrow glabrous panicle; calyx 4-ribbed, with a few long bristles, shortly bell-shaped and spreading somewhat in the manner of *Memecylon*, minutely and shallowly sinuate-toothed; petals obovate, almost 2 lin. long; stamens 8; anthers and connective without any appendage; ovary on the bottom of the calyx free.

HAB.—Marlaban.

2. *A. umbellulata*, H.f.—An evergreen shrub, 10 ft. high, all parts glabrous; leaves much resembling those of *A. exigua*, long-petioled, ovate-oblong to ovate-lanceolate, obtuse or cordate at the base, acuminate, 6-9 in. long, 5-nerved and transversely parallel-veined, glabrous; flowers 4-merous, on minutely puberulous pedicels, usually by 3 or fewer, forming a poor, long-peduncled, trichotomous, minutely puberulous, glabrescent, raceme-like panicle in the axils of the leaves and much shorter than them, the rachis 4-cornered; bracts deciduous; calyx nearly 3 lin. long, clavate-bell-shaped, minutely puberulous, obsolete 4-cornered, 4-lobed, the lobes short, on the back furnished with a semicordate, blunt, rather thick wing-like appendage; petals oblong, acute; stamens 8, unequal, the 2 longest erect (not inflexed) in the bud; ovary 4-celled.

HAB.—Tenasserim, Mergui Archipelago.

### ANERINCLEISTUS, Korth.

Calyx widely bell-shaped, hirsute, the limb 4-lobed, persistent. Petals 4, minute. Stamens 8, equal; anthers opening by a single

apical pore, the connective not produced at the base, shortly spurred behind. Ovary almost free, 4-celled, broadly earved out at the apex, 4-lobed, the style short, with a punctiform stigma. Capsule 4-valved on the carved-out apex, longer than the calyx. Seeds minute, obovoid-euneate.—Shrubs or little trees, with 5-7-nerved leaves. Flowers small, usually in axillary or terminal clusters or umbellets.

Appressed pubescent . . . : : : : : *A. Helferi*.  
 Spreadingly velvety-tomentose : : : : : *A. Griffithii*.

1. *A. Helferi*, H.f.—A shrub, the branchlets terete, covered with tawny appressed pubescence; leaves oblong to ovate-lanceolate, on a densely appressed, pubescent, tawny petiole 2-3 in. long, acute or obtuse at the base, acuminate, 5-8 in. long, 5-7-nerved, with parallel, transverse and curved veins, on both sides (more so beneath) softly appressed pubescent, membranous; flowers small, on very short, densely appressed-pubescent pedicels, forming axillary small clusters; calyx-tube  $\frac{1}{6}$  in. long, hemispherical, strigose; anthers oblong, blunt, the connective neither appendaged nor spurred; ovary 4-sealed at the apex; capsule intrusely 4-valved at the apex, enclosed in the hemispherical villous calyx.

HAB.—Tenasserim or Andamans (?).

2. *A. Griffithii*, H.f.—Softly tomentose, the woody branches terete, along with the petioles and principal leaf-nerves densely and spreadingly rusty-velvety-tomentose; leaves and inflorescence as in *A. petiolatus* (sic), but the calyx very densely and spreadingly hirsute.—(Deser. after Triana.)

HAB.—Tenasserim, Mergui Archipelago.

## OCHTHOCHARIS, Bl.

Calyx glabrous, the tube hemispherically bell-shaped or obovoid, terete, without ribs, the limb 5-toothed, persistent. Petals 5. Stamens 10, equal; anthers almost straight, opening by a single apical pore, the connective not produced, but at the base in front tubercled or spurred. Ovary adherent to the calyx-tube, 5-celled, glabrous on the swollen apex; style filiform, with a punctiform stigma. Capsule globular, enclosed in the membranous smooth calyx, 5-valved. Seeds minute, irregularly cuneate.—Erect, usually small shrubs, with 3- to 5-nerved leaves. Flowers minute, forming axillary clusters or short cymes, or rarely lax, axillary and terminal panicles.

1. *O. Javanica*, Bl.—An evergreen low-branched erect shrub, about 2 to 3 ft. high, all parts glabrous; leaves lanceolate to elliptically lanceolate, tapering at the base in a petiole  $\frac{1}{3}$  to  $\frac{3}{4}$  in. long, acuminate, 2-3 in. long, minutely and distantly bristly serrate,

glabrous, 3-nerved, with 2 faint intramarginal ones, the transverse parallel veins little visible; flowers very small, rose-coloured, on  $\frac{1}{2}$  to 1 lin. long bracteolate pedicels, forming short glabrous cymes in the axils of the leaves; bracts lanceolate, minute; calyx about a line long, glabrous, obsoletely ribbed; petals about as long as the calyx; capsules globular, the size of a small pea, enclosed in the smooth calyx.

HAB.—Tenasserim.

### ANPLECTRUM, A. Gray.

Calyx-tube ovoid-globular, the limb truncate or obsoletely 4-toothed, the teeth alternating with as many punctiform teethlets. Petals 4. Stamens 8, very unequal; anthers alternately imperfect, the larger ones ovoid or oblong, opening by a single apical pore, the connective not produced, not appendaged, or 2-lamellate at the base or shortly spurred behind. Ovary free above, 4-celled, crowned with 4 crests; style filiform, with a punctiform stigma. Berry almost globose, crowned by the calyx-limb. Seeds numerous, wedge-shaped, angular.—Scandent shrubs, with 3-to 7-nerved leaves. Flowers small, in terminal and axillary panicles.

1. *A. cyanocarpa*, Triana.—An evergreen slender, half-scandent shrub, the branchlets and petioles above bristly-hairy; otherwise glabrous; leaves on a 2 to 4 lin. long petiole, ovate-oblong to ovate, sometimes slightly cordate at the base, 3-4 in. long, bluntish acuminate or apiculate, entire, thin chartaceous, glossy above, glabrous, or while young sparingly bristly hairy on the nerves beneath, 3-nerved, with 2 intramarginal nerves, transversely and rather distantly parallel-veined; flowers 4-merous, shortly pedicelled, cymose, forming a large, terminal, compound, but rather lax, glabrous panicle; bracts deciduous; calyx smooth, with the limb truncate and obscurely toothed, the tube ovoid-oblong, 2 lin. long; petals ovate, acute; fertile stamens 4, beaked, without any appendage; staminodes 4, alternating with the stamens, but sometimes the one or other quite abortive; filament broad, flat, terminating in a hastate-triangular at the apex usually 2-cleft membrane excurrent at the inner base into a bristle longer than the filament itself; berries ovoid, quite smooth, crowned by the narrow truncate calyx-limb.

HAB.—In the tropical forests of Tonkyeghat, Martaban; Tenasserim.

### PTERNANDRA, Jack.

Calyx usually smooth, hemispherical, the limb deciduous, truncate, or more or less distinctly 4-toothed or calyptrate and circum-

sciss or irregularly rupturing. Petals 4. Stamens 8, equal; filaments short, subulate; anthers from ovate to oblong and dolabri-form, opening by 2 longitudinal slits, the connective not produced, with or without spurs at the base of the back. Ovary adhering to the calyx, 4-celled, glabrous on the depressed apex; style filiform, with a club-shaped or thickened stigma. Berry more or less globular, truncate at the depressed apex, smooth or variously scaly or tubercled. Seeds angular-wedge-shaped.—Small trees or shrubs, with 3-nerved leaves. Flowers small, solitary, or clustered, or forming axillary cymes or panicles.

Flowers in small brachiate panicles . . . . . *P. coerulescens*.  
 Flowers in a sessile or almost sessile cyme or almost fascicled . . . *P. capitellata*.

1. *H. coerulescens*, Jack.—An evergreen branched small tree, all parts quite glabrous; leaves from ovate to ovate-oblong, tapering into a short robust petiole, bluntish acuminate, entire, coriaceous, 2-3½ in. long, quite glabrous, glossy, especially beneath, 3-nerved, the transverse veins rather faint; flowers small, sky-blue, on ½ a line long or shorter strong pedicels, forming short, glabrous, brachiate, often almost sessile panicles in the axils of the leaves and also at the end of the branches; peduncles 4-cornered; bracts minute, ovate, acute; calyx about a line long and wide, truncate or obsoletely 4-toothed, in a dried state obscurely reticulate-scaly; petals ovate, acuminate; berries enclosed in the calyx, truncate-globular, about the size of a pepper-kernel, reticulate-rough, at the apex marked by the circular calyx-limb.

HAB.—Tenasserim.

2. *P. capitellata*, Jack.—An evergreen large shrub, all parts quite glabrous, the branches terete; leaves elliptically ovate to ovate, tapering in a strong 2-3 lin. long petiole, bluntish acuminate to bluntish, 3-5 in. long, coriaceous, entire, glabrous, rather opaque, strongly 3-nerved, with 2 faint intramarginal nerves, the transverse more or less curved veination faint; flowers small, sky-blue, on a line long pedicels, forming small, sessile or almost sessile, brachiate, glabrous cymes often reduced to mere clusters; calyx smooth, about 1½ lin. long, smooth, truncate; berries depressed-globular, the size of a small pea, smooth, crowned by the shallow circular calyx-limb.

HAB.—Tenasserim.

## MEMECYLON, L.

Calyx smooth, the tube hemispherical or bell-shaped, the limb dilated, entire, or shallowly 4-5-lobed, often radiately lamellate or nerved within. Petals 4 or 5. Stamens 8, equal; filaments fili-



\* \* *Calyx not radiate-lamellate veined within, or the nerves very faint.*

Leaves sessile or nearly so, turning yellowish and opaque in drying; cymes sessile, umbel-like; calyx conspicuously 4-toothed, *M. umbellatum*.

\* *Calyx radiately nerved within, the nerves raised and lamellate like the gills of a mushroom.*

1. *M. cœruleum*, Jack.—An evergreen shrub, 10 or 12 ft. high, all parts glabrous, the branchlets terete or nearly so; leaves almost sessile or on a very short thick petiole, from elliptically ovate to ovate-oblong, rounded or almost cordate at the base, blunt or retuse and mucronate, or acute or rarely apiculate, 4-5 in. long, thick coriaceous, with the lateral nerves not or almost not visible, glabrous, the narrow hyaline borders recurved; flowers conspicuous, but not large, deep steel-blue, on short thick pedicels, forming a very short robust eyne on a very short peduncle, or almost sessile and solitary or several together in the axils of the leaves or above the scars of the fallen ones; peduncle and branchings thick and almost terete; bracts and bractlets minute, ovate-triangular, acute; calyx smooth, bell-shaped, about a line long and a little wider, the limb truncate and remotely minute-toothed, cruciately and lamellately 4-nerved within, the nerves 2-cleft from the middle, the 4 accessory nerves very faint; filaments very short, the connective very large, with a gland in front of the apex; berries ellipsoid-oval or ellipsoid-globular, smooth, about the size of a large pea, usually 1-seeded, crowned by the tubular at middle 4-angular scarred calyx-limb, the disk marked by the 4 broad cruciately diverging nerves, 2-cleft from their middle.

Var. 1. *cœruleum* proper: berries ellipsoid-oval, up to nearly 5 lin. long; leaves almost sessile, usually acute.

Var. 2. *floribundum* (*M. floribundum*, Bl.): berries ellipsoid-oval, up to nearly 5 lin. long; leaves on a petiole 1-1½ lin. long, rounded at the base, usually acute.

Var. 3. *Griffithianum* (*M. cordatum*, Griff.): berries ellipsoid-globular, about 3-4 lin. in diameter; leaves almost sessile, often blunt or retuse with a mucro.

HAB.—Only var. 3, but this apparently frequent in Tenasserim.—Fl. July-Aug.; Fr. March.

2. *M. pulchrum*, Kz. — An evergreen tree, all parts quite glabrous, the branchlets nearly terete; leaves large, sessile, broadly ovate-oblong, rounded or almost cordate at the base, blunt or notched, 5-6 in. long, firmly coriaceous, 1-nerved without visible lateral nerves or veins, glabrous, glossy above; flowers sky-blue, on 1½ to 2½ lin. long, terete pedicels, in few-flowered umbellets supported

by  $\frac{1}{2}$ - $\frac{1}{4}$  in. long, 4-cornered secondary peduncles and forming a rather ample cyme on the compressed 4-cornered  $\frac{1}{2}$ -1 in. long peduncles arising by 3 or 4 from above the scars of the fallen leaves; bracts distinct, ovate-lanceolate, acute; calyx bell-shaped, about a line long and wide, smooth, the limb truncate, radiately folded within.

HAB.—Tropical forests of the Andaman islands.—Fl. Begin, of May.—s.

3. *M. edule*, Roxb.; Bedd. Sylv. Madr. 113.—An evergreen little tree, often branched already from the base or remaining shrubby, all parts quite glabrous, the branchlets terete, the stem as thick as the arm or thicker; bark thin, blackish brown, longitudinally and thinly fissured; leaves ovate, at the rounded base contracted in a strong petiole 3-4 lin. long, bluntish and almost caudate-acuminate, 3-4 in. long, firmly coriaceous, smooth, shining above, the lateral nerves little visible; flowers sky-blue, small, on very slender 1-2 lin. long pedicels, in poor umbellules on the short ultimate peduncles, forming either a compact cyme by reduction of the lateral branchings apparently simple or more usually compound peduncled thyrsoïd cymes arising either solitary or by 2 or 3 from the axils of the leaves or from above the scars of the fallen ones; peduncles 4-6 lin. long, compressed, the secondary ones as long or somewhat shorter, the ultimate ones usually very short; calyx smooth, about a line across, the adnate portion somewhat obovate, radiately nerved within, the nerves hardly lamellate, raised; limb broad, obsoletely 4-toothed; petals about a line long, ovate, acute; filaments long-exserted; berries as large as a pea, glabrous, globular, when ripe bluish black and sappy, 1-seeded, crowned by the very short inconspicuous calyx-limb round a smooth disk.

HAB.—Tenasserim; not unfrequent in the tropical forests of South Andaman.—Fl. Apr.-May; Fr. June.—s.

4. *M. ovatum*, Sm.—An evergreen little tree or large shrub, all parts quite glabrous, the branchlets terete, with 4 elevated lines; bark dark coloured, rough; leaves from oval to oblong-lanceolate, tapering in a short petiole, bluntish to bluntish acuminate, sometimes almost notched, usually only 2-3 in. long, but often longer, entire, coriaceous, without any lateral nerves or veins, glossy above, quite glabrous; flowers small, blue, on rather short but slender terete pedicels, forming a small umbellule on the knob-like thickened apex of the ultimate ramifications and collected into short-peduncled compound umbels arising solitary or by 2-3 from above the scars of the fallen leaves or from the older branches; peduncles short, usually only 2-3 lin. long, 4-angular; calyx about  $\frac{1}{2}$  a lin. long, bell-shaped, lamellate-nerved within, the limb truncate and obsoletely denticulate; petals obovate, acute, about a line long; stamens long-exserted; berries globular, the size of a pea, when

ripe bluish black and edible, by abortion usually 1-seeded, crowned by the calyx-limb, the disk radiately 8-lamellate.

HAB.—Frequent in the tropical and moister upper mixed forests from Martaban down to Tenasserim; also Chittagong.—Fr. Nov.-Feb.—s.

5. *M. lævigatum*, Bl.—An evergreen small tree, all parts quite glabrous, the branchlets terete; leaves lanceolate to elliptically lanceolate, slightly oblique, at the acuminate base decurrent into a short robust petiole, longer or shorter acuminate, 3-4 in. long, thick coriaceous, without nerves or veins, glossy above, in drying turning more or less black; fruiting cymes very short peduncled or almost sessile, robust; pedicels thick and only a line long; berries globular, the size of a pea, 1-seeded, crowned by the short obsoletely 4-lobed calyx-limb, the disk radiately lamellate-nerved.

HAB.—Tenasserim.—Fr. Oct.

6. *M. plebejum*, Kz.—An evergreen tree (20—25+8—10+2—3), all parts quite glabrous, the branchlets terete with 4 raised lines; leaves ovate-lanceolate, tapering into a short petiole, sharply caudate-acuminate,  $1\frac{1}{2}$ – $2\frac{1}{2}$  in. long, in drying turning blackish, thin coriaceous, the lateral nerves thin and faint; flowers minute, on  $1$ – $1\frac{1}{2}$  lin. long slender pedicels, umbellate, and forming a very short peduncled or almost sessile trichotomously branched small cyme in the axils of the leaves; calyx explanate-bell-shaped, about a line in diameter; the limb ample, minutely and distantly 4-toothed, radiately lamellate within; petals, &c., unknown.

HAB.—Frequent in the swamp forests of the Irrawaddi alluvium; rather rare in the Prome and Ava.—s.—SS. = All.

7. *M. punctatum*, Presl.—An evergreen shrub or tree (?), all parts quite glabrous, the branchlets with 4 decurrent raised lines; leaves from lanceolate to elliptically lanceolate, on a short but slender petiole 1-2 lin. long, shortly bluntish acuminate, but not retuse, thick coriaceous, without lateral nerves or veins, in a dried state blistered-dotted, 1-2 in. long, opaque; flowers small, on  $1$ – $1\frac{1}{2}$  lin. long, thick, stiff pedicels, forming a poor umbellet on the 1-2 lin. long peduncle or almost sessile in the axils of the leaves or above the scars of the fallen ones; calyx about a line wide, the adnate portion almost globular and tubercled-rough; the limb ample and almost truncate, radiately lamellate within; petals ovate-triangular, acute; stamens exserted; berries globular, the size of a very small pea, almost smooth.

HAB.—Tenasserim.

8. *M. scutellatum*, Naud.—An evergreen bushy shrub or small tree, all parts quite glabrous, the branchlets 4-cornered and 4-lined; leaves small, from elliptically oblong and oblong to obovate, retuse

or bluntish, on a slender 1-2 lin. long petiole, 1-2 in. long, very coriaceous and without lateral nerves or veins, glossy above, beneath pale coloured; flowers small, sky-blue, on about a line long slender pedicels, forming 1 to 3 simple umbellets on an obscurely 4-gonous 1-1½ lin. long peduncle or almost sessile and clustered in the axils of the leaves or above the scars of the fallen ones; calyx broadly bell-shaped, with the adnate basal portion very obscure, smooth, about ½ lin. long or a little longer, broadly and shortly 4-toothed, the limb inside radiately 8-lamellate; petals ovate, acute, about a line long; stamens exserted; berries almost globular, the size of a small pea, smooth, 1-seeded, crowned by the short calyx-limb, the disk cruciately 4-nerved, the nerves 2-cleft from their middle.

Var. 1. *subsessile*: umbellets on peduncles less than a line long or almost sessile; pedicels about a line long; leaves smaller.

Var. 2. *brevipedunculatum*: umbellets on a 2-1 lin. long peduncle; pedicels usually 2 lin. long; leaves larger.

HAB.—Var. 2: apparently frequent in Tenasserim; also Pegu, above Rangoon.—Fl. Apr.-June; Fr. Feb.-May.

9. *M. elegans*, Kz.—An evergreen shrub or small tree, all parts quite glabrous, the branchlets almost 4-winged or with 4 decurrent more or less obsolete raised lines; leaves from oblong to ovate-oblong, at the base tapering into a 2-3 lin. long petiole, blunt or sometimes obscurely notched, 3-4 in. long, coriaceous, the lateral nerves only in young leaves visible; flowers blue, on 2-3 lin. long pedicels, forming a simple or trichotomous umbel-like cyme on ½-¾ in. long sharply 4-cornered peduncles arising usually by pairs or singly from the axils of the leaves or from above the scars of the fallen ones; ramifications very short or almost reduced; calyx smooth, nearly 1½ lin. in diameter, the adnate portion hemispherical, small; limb broad and explanate, waved and obscurely rounded-lobed, radiately-lamellate within, the lamellæ almost nerve-like; petals, &c., unknown.

HAB.—In the tropical forests of South Andaman.—Fl. May.—s.—SS.—SIS.

10. *M. pauciflorum*, Bl.—An evergreen tree (20—25+6—10 + ½—1), all parts quite glabrous, the branchlets more or less sharply 4-cornered; leaves ovate to broadly ovate, on a slender petiole ¾-1 lin. long, bluntish apiculate or notched, rarely almost acute, 1-1½ in. long, coriaceous, smooth, glossy above, the lateral nerves very faint and thin; flowers minute, whitish, about ½ a line in diameter, on slender about a line long pedicels, either forming a very poor umbellet on ½ to a line long almost terete peduncles, or sessile or nearly so and clustered in the axils of the leaves; calyx

about  $\frac{1}{2}$  lin. long, bell-shaped, the adnate portion short, almost globular; limb almost abruptly 4-toothed (the teeth linear, acute), radiately narrow-lamellate inside; corolla in bud acuminate; berries globular, the size of a pepper-kernel, smooth, 1-seeded, crowned by the sharply toothed calyx-limb, the disk smooth or very faintly cruciately 4-nerved.

HAB.—Frequent in the tropical coast forests of the Andamans; also Tenasserim.—Fl. begin. of R.S.—s.

11. *M. Griffithianum*, Naud.—An evergreen large shrub, all parts quite glabrous, the branchlets ash-grey, almost terete, with 4 decurrent lines; leaves oblong to elliptically oblong, acute at the base and produced into a robust 1-2 lin. long petiole, shortly or rarely longer acuminate, thin coriaceous, about 3-5 in. long, glabrous, glossy above, the lateral nerves thin, but prominent and anastomosing towards the margins; flowers minute, on  $\frac{1}{2}$  to nearly a line long rather stiff pedicels, forming small poor umbellets on the summit of the thickened very short partial peduncles and collected in a rather ample thyrsoid compound cyme in the axils of the leaves or above the scars of the fallen ones; peduncle about  $\frac{1}{2}$ -1 in. long, 4-cornered and sometimes compressed, the primary ramifications nearly as long and more sharply 4-cornered; calyx about  $\frac{2}{3}$  lin. in diameter, explanate, the limb truncate and radiately lamellate within, the borders obsoletely sinuate-4-angular; berries globular, the size of a pea, glabrous, one-seeded, crowned by the short calyx-limb, the disk radiately 8-lamellate.

HAB.—Tropical forests of Tenasserim.

12. *M. caastrinum*, Kz.—An evergreen tree (30—40+12—15+2—3 $\frac{1}{2}$ ), all parts quite glabrous, the branchlets terete, with 4 raised decurrent lines; bark ash-grey, smooth, hardly a line thick; cut pale coloured, dry; leaves from elliptically to almost ovate-oblong and ovate-lanceolate, acute at the base, on a thick 2-2 $\frac{1}{2}$  lin. long petiole, shortly or long and almost caudate-acuminate, with or without a mucro, 4-5 in. long, thin coriaceous, rather glossy above, turning more or less yellowish green in drying, the lateral nerves thin, but visible and anastomosing towards the margins; flowers small, sky-blue, on slender 1-2 lin. long pedicels, forming poor umbellets on the very short partial peduncles and collected into a single or more usually two greenish white, glabrous, peduncled cymes in the axils of the leaves; peduncle about 3 to 5 lin. long, more or less compressed; calyx white, smooth, nearly a line deep and 1-1 $\frac{1}{2}$  lin. in diameter, bell-shaped, then explanate, almost truncate and minutely 4-toothed, radiately lamellate within; petals nearly a line long; berries globular, the size of large pea, glabrous, green, 1-seeded, crowned by the short calyx-limb, the disk radiately 8-lamellate.

HAB.—Frequent in the tropical forests from Martaban down to Tenasserim, less so in those along the eastern slopes of the Pegu Yomah.—Fl. Feb.-Apr.—Fr. January.—SS.—*Metam.* SiS.

REMARKS.—Wood very coarse, red-brown.

13. *M. cerasiforme*, Kz.—An evergreen tree, all parts glabrous; leaves elliptical, acuminate at both ends, on a stout petiole 2-3 lin. long, 2½-3 in. long, coriaceous, usually drying yellowish, the lateral nerves faint and obsolete; fruiting cymes short peduncled or almost sessile, small and not above ½ in. long, glabrous, axillary or from above the scars of the fallen leaves; berries on a lin. long stout pedicels, globose, the size of a cherry, sappy, bluish black.

HAB.—Tropical forests of Chittagong.—Fr. C.S.

\* \* *Calyx inside without lamella-like nerves, or the nerves very obsolete.*

14. *M. umbellatum*, Burm.; Bedd. Sylv. Madr. t. 206.—An evergreen little tree or large shrub, all parts quite glabrous, the branchlets terete, with 4 raised decurrent lines; leaves almost sessile or rarely very shortly petioled, from elliptically oblong and oblong to elliptically lanceolate, more or less bluntish acuminate, 2-3 and sometimes 4 in. long, coriaceous, almost opaque, in drying turning yellowish, the lateral nerves indistinct; flowers small, sky-blue, on about 2 lin. long slender pedicels, forming a many-flowered umbel-like cyme on a very short (½ a line long) peduncle or almost sessile arising from above the scars of the fallen leaves; calyx nearly a line long and somewhat wider, with a hemispherical tube; limb broad, conspicuously 4-toothed, with the teeth broad and acute, very obscurely radiate-nerved within; petals about a line long, acute; berries ovoid-globular, about the size of a small pea, smooth, usually 1-seeded, crowned by the calyx-limb.

HAB.—Arracan and Andamans, in tropical forests.—s.—SS.—SiS.

REMARKS.—Wood very strong and tough, very hard and close-grained. Good for cart-axles and forms a sort of box-wood. Leaves and flowers a yellow dye.

### LYTHRARIÆ.

Flowers hermaphrodite, very rarely unisexual, regular or rarely irregular. Calyx free, but often enclosing the ovary, 4-5. (very rarely 3- or 6- or more) -lobed or toothed, the lobes often alternating with as many accessory teeth. Petals as many as calyx-lobes, rarely wanting, inserted at the summit of the calyx-tube, usually clawed, imbricate and usually crumpled in the bud. Stamens as many as petals, or more or fewer, inserted in the calyx-tube; filaments inflexed in the bud; anthers versatile, the cells opening longitudinally. Ovary superior or (in a few abnormal genera)

inferior, 2-6- or rarely by abortion of the partitions 1-celled, with usually numerous ovules attached to the axis or very rarely parietal; style simple, with a capitate or rarely 2-lobed stigma. Fruit a capsule, variously dehiscing, enclosed in or surrounded by the persistent calyx. Albumen none. Embryo straight; cotyledons oblong or orbicular-cordate.—Herbs, shrubs, or trees, with opposite, whorled, or sometimes alternate simple leaves. Stipules none. Flowers in axillary or terminal panicles, cymes, or clusters, rarely solitary.

The timber of *Lagerstræmia*, *Crypteronia*, and some others is valuable. Henna, a reddish orange dye, is the produce of *Lawsonia*, and a similar dye is obtained from the flowers of *Woodfordia*. Pomegranates are the only edible fruits in this family. Thirty-one species occur in Burma.

\* Ovary free, superior.

× Leaves beneath blackish-dotted; calyx slightly curved; seeds pilose

*Woodfordia*.

× × Leaves without or with pellucid dots beneath. Calyx straight.

○ Stamens as many or twice as many as calyx-lobes. Calyx 12-toothed; petals 6; stamens 12; capsule 1-celled, transversely circumsciss

*Pemphis*.

Calyx 4-parted; petals 4; stamens 8; capsule 4-celled, irregularly bursting

*Lawsonia*.

Calyx 4- or 5-cleft; petals none; stamens 4 or 5; capsule 2-celled and 2-valved

*Crypteronia*.

○ ○ Stamens indefinite, in 1 or 2 or more rows.

† Seeds free, not imbedded in pulp.

Stamens in 2 or more rows; capsule 3-6-celled; seeds large, expanded in a lateral wing

*Lagerstræmia*.

Stamens in a single row; capsule 4-8-celled; seeds minute, scabiform, narrowly winged at the upper margin

*Duabanga*.

† † Seeds angular, imbedded in pulp; berry 10-15-celled

*Sonneratia*.

\* \* Ovary adnate to the calyx, inferior, many-celled, the cells irregularly superposed; stamens numerous in many rows; seeds pulpy

*Punica*.

## WOODFORDIA, Salisb.

Calyx coloured, tubular, slightly curved with an oblique mouth, shortly 6-lobed, the lobes alternating with as many minute accessory teeth. Petals 6, small, or none. Stamens 12, inserted at the bottom of the calyx-tube, long-exserted, alternately longer, declinate. Ovary sessile, 2-celled, with numerous ovules attached to the very thick axile placenta; style filiform, with a punctiform stigma. Capsule enclosed in the calyx, compressed, 2-celled, locnecidally 2-valved. Seeds numerous, minute, somewhat compressed-obcuneate, papillose-pilose.—Shrubs or small trees, with opposite black-dotted leaves. Flowers crimson, usually cymose-panicled; pedicels 2-bracted at the base.

1. *W. fruticosa*, Kz. (*W. tomentosa*, Bedd. Sylv. Madr. 117, t. 14, f. 4; *W. floribunda*, Salisb. ; Brand. For. Fl. 238).—A leaf-shedding large shrub, often growing out into a little tree of 12 to 15 ft. high, all parts more or less greyish pubescent or tolerably glabrous, the younger branchlets 4-cornered; leaves very shortly petioled or almost sessile, from linear-lanceolate to lanceolate, cordate or rounded at the base, acuminate, 3-5 in. long, entire, firmly membranous, above green and minutely pubescent, beneath black-dotted and greyish or whitish velvety or shortly tomentose; flowers nearly  $\frac{1}{2}$  an in. long, bright crimson, forming axillary short-peduncled cymes or small-leaved cymose panicles; calyx tubular, puberulous, tapering into a rather slender puberulous pedicel; petals only about a line long, crimson; capsules enclosed in the calyx, elongate-oblong, compressed, about 4-5 lin. long.

HAB.—Frequent in the mixed dry forests of the Prome District; rarely entering the drier upper mixed forests.—Fl. Fr. Jan.-Feb.—1.—SS.—CaS.

REMARKS.—The flowers yield a valuable red dye of considerable importance.

### PEMPHIS, Forst.

Calyx coriaceous, turbinate-bell-shaped, 6-lobed, the lobes erect, alternating with as many smaller, spreading, accessory teeth. Petals 6, inserted at the throat of the calyx. Stamens 12, almost 2-seriate, alternately shorter. Ovary enclosed in the calyx-tube, very shortly stalked, 3-celled, with many erect ovules attached to the thick axillary placentas of each cell; style rather thick and short, with a capitate stigma. Capsule enclosed in the calyx-tube, by obliteration of the septa 1-celled, irregularly circumsciss-dehiscent above the middle. Seeds many, compressed, obversely cunate, rather large, erect from a basilar placenta, expanded into a thick wing.—Shrubs, with opposite rather thick leaves. Flowers axillary, solitary, the peduncles 2-bracted at the base.

1. *P. acidula*, Forst.; Bedd. Sylv. Madr. 117, t. 14, f. 5.—An evergreen shrub, all parts more or less greyish silk-hairy, the younger parts 4-cornered; wood light brown, close-grained, and strong; leaves almost sessile or very shortly petioled, from oblong to oblong-lanceolate, blunt or nearly so, about  $1\frac{1}{2}$  to  $\frac{1}{2}$  in. long, thick-membranous, entire, more or less silky-canescens on both sides, 1-nerved; flowers white, rather small, on short, thick, puberulous peduncles 2-bracted at the base, solitary in the axils of the leaves; calyx almost bell-shaped, elevated-12-striate, appressed  $\frac{1}{2}$  lin. long, very little protruded from the calyx, glabrous, crowned by the persistent style.

HAB.—Tenasserim, along the rocky coasts from Amherst down to Mergui; also Andamans.—Fl. Fr. Oct. and Apr.

## LAWSONIA, L.

Calyx-tube broadly turbinate, 4-lobed, without accessory teeth. Petals 4, sessile. Stamens 8, inserted on an annular ring at the top of the calyx-tube, alternating by pairs with the petals. Ovary filling the calyx-tube, 4-celled, with many ovules in each cell; style filiform, with a small capitate stigma. Capsule surrounded at the base by the persistent calyx, irregularly bursting. Seeds numerous, angular-club-shaped.—Shrubs, with simple opposite leaves. Flowers in lax racemes, forming leafy panicles.

1. *L. inermis*, L. (*L. alba*, Lam.); Bedd. Sylv. Madr. 118, t. 14, f. 6; Brand. For. Fl. 238).—*Dan.*—A leaf-shedding much-branched shrub up to 10-12 ft. high, sometimes growing out into a little tree, all parts glabrous, the branches decussate and often spinescent at the apex; bark rusty-coloured; leaves from ovate and oblong to lanceolate, acute, or rarely obovate and blunt, very shortly petioled, entire, about an inch long or shorter, membranous, glabrous; flowers small, greenish yellow or white, on slender pedicels, in lax little racemes usually forming a large leafy terminal panicle; calyx smooth, deeply 4-lobed, the lobes spreading, about a line long; petals orbicular with incurved much-curved borders; capsule globular, 4-celled and grooved, the size of a very small pea, depressed at the top, crowned by the style.

HAB.—Often cultivated, especially in the Prome zone.—Fl. Fr. nearly ∞.

## CRYPTERONIA, Bl.

Flowers polygamously dioecious or hermaphrodite. Calyx-tube cup-shaped, 4-5-lobed. Petals none. Stamens 4 or 5, inserted at the summit of the calyx-tube and alternating with the lobes. Ovary free, 2-celled, with numerous horizontal or ascending ovules attached in many series to the axillary placentas; style filiform, with an obtuse stigma. Capsule surrounded at the base by the calyx, 2-celled, loculicidally 2-valved. Seeds numerous, minute, wingless, or narrowly winged towards the apex.—Trees, with 4-corned branchlets and opposite entire leaves. Flowers minute, in axillary racemes often collected into panicles.

1. *C. paniculata*, Bl.—*Anan-hyo*.—An evergreen tree (50—80+30—50+4—9), all parts glabrous; bark silvery grey, rather smooth, deeply longitudinally, and minutely transversely, fissured, about  $\frac{1}{2}$  in. thick; cut brown; leaves oblong to oblong-lanceolate, acute at the base, bluntish acuminate or blunt, shortly petioled, entire, chartaceous, about 4-5 in. long, glabrous; flowers minute, whitish, on short but slender puberulous pedicels, forming slender,

puberulous or glabrous racemes arranged in terminal leafless panicles; ovary shortly greyish tomentose; calyx hardly 1-1½ lin. in diameter, 5-toothed, minutely appressed pubescent, the teeth triangular-lanceolate, acute; stamens in hermaphrodite flowers only as long as the calyx-teeth, in the males elongate and slender; capsules as large as a pepper-kernel, almost 2-lobed, minutely velvety and glabrescent, crowned by the persistent style; seeds minute, linear, brown and glossy, narrowly winged along one side, the wing produced at both ends.

Var. 1. *glabra* (*Hemsloria glabra*, Wall.): rachis of racemes, at least when in fruit, glabrous.

Var. 2. *pubescens* (*H. pubescens*, Griff., not Planch.): rachis of racemes permanently densely puberulous.

HAB.—Var. 2. Frequent in the tropical and moister upper mixed forests, from Chittagong, Pegu, and Malacca down to Texas-prim.—Pl. Nov.-Jan.; Fr. Feb.-May.—xl.—88. = Sis. Metam., etc.

REMARKS.—Wood pale to reddish brown, fibrous, close, but not straight-grained, rather heavy, the annual rings narrow. Used occasionally for cart-wheels, but more in use for firewood.

### LAGERSTRÆMIA, L.

Calyx-tube turbinate-bell-shaped, 4-6- (rarely 7-) lobed, plain or plaited-furrowed. Petals 4-6, clawed, crumpled. Stamens numerous, inserted near the base of the calyx-tube; filaments long, exerted. Ovary sessile, enclosed in the calyx-tube, 3-6-celled, with numerous ascending ovules attached to the axillary placentas; style flexuose, filiform, with a capitate stigma. Capsule at the base surrounded by the calyx, woody or rigidly coriaceous, 3-6-celled, opening loculicidally into 3-6 valves, each valve bearing the partition in its centre. Seeds few or many, compressed, imbricate, or shrubs, with opposite entire leaves. Flowers usually showy, 2-bracteole, in axillary or terminal usually trichotomously branched panicles.

\* *Calyx terete, without ribs or furrows.*

○ *Calyx and all other parts glabrous.*

Leaves whitish-glaucous beneath; flowers hardly ½ an in. in diameter

Leaves uniformly green; flowers 1½-2 in. in diameter. : : *L. parviflora.*

○ ○ *Calyx and inflorescence covered by a rusty-coloured tomentum.* : : *L. Indica.*

Flowers almost racemose, in panicles; calyx ½-3 shorter than the capsule

\* \* *Calyx furrowed, plicate-sulcate or angular, with the angles acute or almost winged.* : : *L. calyculata.*

○ *Ribs or angles twice as many as calyx-lobes, the alternating shorter ones terminating at the sinuses of the lobes, the longer ones running throughout the lobes,*

× *Calyx and inflorescences covered by a rusty-coloured tawny or white floccose tomentum; calyx-lobes terminating in a subulate or short mucro.*

Full-grown leaves glabrous, acuminate; tomentum rusty-coloured; petals on short claws, not fringed . . . *L. floribunda.*

Adult leaves puberulous beneath, acuminate; tomentum whitish or yellowish; petals on long slender claws, ciliolate . . . *L. tomentosa.*

As former; leaves mucronate or acute; flowers twice as large; petals conspicuously fringed . . . *L. Londoni.*

× × *Calyx and inflorescence pruinose or minutely whitish or greyish puberulous. All other parts glabrous.*

Leaves whitish-glaucous beneath; calyx 10-12-angular, the angles acute . . . *L. hypoleuca.*

Leaves green; calyx plicately-sulcate, the ribs very blunt and broader than the furrows . . . *L. flos-regina.*

Leaves green; calyx longitudinally-furrowed without ribs . . . *L. macrocarpa.*

○ ○ *Angles of calyx as many as lobes and alternating with them, the latter without ribs.*

All softer parts almost greyish from a short soft pubescence; angles of calyx almost winged; petals none . . . *L. villosa.*

\* *Calyx terete, without ribs or furrows.*

1. *L. parviflora*, Roxb.; Bedd. Sylv. Madr. t. 31; Brand. For. Fl. 239.—A leaf-shedding tree (20—30 + 10—15 + 3—5), often remaining shrubby, all parts glabrous; leaves oblong to ovate-oblong, rounded or almost cordate at the base, blunt or acute, 2-3 in. long, chartaceous, glabrous, whitish-glaucous beneath; flowers small, about  $\frac{1}{2}$  in. in diameter, white, on long filiform pedicels, by 2-3 or solitary on long slender peduncles and forming lax panicles in the axils of the leaves or at the end of the branchlets; calyx glabrous, without ribs or furrows, deeply 6- or occasionally 7-lobed, the lobes triangular, acute; petals orbicular, clawed, crumpled; outer 6 stamens much longer than the inner ones; capsules oblong or obovate-oblong, about an inch long, woody.

HAB.—Burma, probably Ava.—Griff.—Fl. Apr.

REMARKS.—Wood greyish or light brown, close-grained, straight-fibrous, elastic, hard, takes very fine polish. □' = 40 pd. Good for building purposes, beams, rafters, boats, axles, etc.

2. *L. Indica*, L.—A leaf-shedding tree (10—20 + 4—8 +  $\frac{1}{2}$ —1 $\frac{1}{2}$ ), all parts glabrous, the branchlets almost winged-cornered; leaves obovate to obovate-oblong, blunt or acute, very shortly petioled or almost sessile, chartaceous, 2-3 in. long, glabrous; flowers middling sized, crimson or white, slenderly pedicelled, solitary or in peduncled poor cymes forming a more or less branched glabrous panicle at the end of the branchlets; calyx glabrous, without ribs or furrows, deeply 6-lobed, the lobes oblong-lanceolate, acute; petals broad, crumpled and curled, on long claws; outer 6 stamens longer and larger than the numerous inner ones; capsules globose, more  $\frac{1}{2}$  an in. in diameter, 6-celled and 6-valved.

HAB.—Generally cultivated in gardens of Ava, Pegu, and Martaban down to Tenasserim.—Fl. May-June.

3. *L. calyculata*, Kz.—*Pyimma-kyoo*.—An evergreen tree (60—70+30—40+4—7), the shoots tomentose; bark quite smooth, about 2-3 lin. long, grey, peeling off into concave pieces; cut greenish pale-brown; leaves oblong, rounded at the unequal base and somewhat decurrent on the short petiole, acuminate, about 5-7 in. long, almost coriaceous, glabrous and minutely net-veined above, beneath puberulous and strongly net-veined between the prominent nerves; flowers not seen; panicles terminal, rusty or tawny tomentose, composed of longer or shorter racemes; fruiting calyx cupular-bell-shaped, about 2-2½ lin. deep, without ribs or furrows, densely rusty tomentose, 6-lobed, the lobes shortly triangular, acute, reflexed; capsules on very short thick pedicels either solitary or by 2 or 3 on a hardly a line long peduncle, oblong, mucronulate, glossy, for about ½ to ¾ protruded from the closely embracing calyx, 3-4 lin. long, 6-valved.

HAB.—Frequent in the tropical forests of Martaban east of Tounghoo.—Fr. March-Apr.—s.—SS.—Metam.

REMARKS.—Wood brown, heavy, of somewhat unequal fibre, close-grained, rather soft, soon attacked by xylophages.

\* \* *Calyx-furrowed, plicate-sulcate, or sharply, sometimes wingedly, angular.*

4. *L. floribunda*, Jack.—*Pyimma kyoo*.—An evergreen small tree, the shoots tawny floccose-tomentose; bark white, smooth; leaves ovate-oblong to ovate-lanceolate, very shortly petioled, rounded at the base, acute, chartaceous, 4-6 in. long, while young tawny floccose beneath, but soon turning quite glabrous, uniformly green; flowers middling sized, about 1½ in. in diameter, rose-coloured and turning white, on shorter or longer jointed tawny floccose-tomentose pedicels, solitary or in peduncled poor cymes, forming a lax, branched, tawny or rusty floccose-tomentose panicle at the end of the branchlets; calyx in bud turbinate, densely tawny floccose-tomentose, strongly 12-sulcate-ribbed, the alternating ribs excurrent in the 6 (or occasionally 7) lanceolate and acute lobes and forming a straight tomentose mucro; petals about ½ an in. long, orbicular, waved; outer stamens curved, much longer than the inner ones.

HAB.—Tropical forests of Upper Tenasserim.—Fl. July-Aug.—s.

5. *L. tomentosa*, Prsl.—*Lai-za*.—A leaf-shedding tree (70—100+50—60+7—12), the shoots whitish or somewhat tawny tomentose, the trunk strongly buttressed at the base; bark about ½ in. thick, greyish, fibrous, but even, dark grey, longitudinally fissured;

leaves from ovate-lanceolate to ovate-oblong, rounded at the base, on a 2-3 lin. long, densely whitish tomentose, glabrescent petiole, acuminate, 4-6 in. long, firmly membranous, while young, especially beneath, densely whitish or somewhat tawny tomentose, turning glabrescent above, beneath puberulous and elegantly net-veined; flowers middling sized, about 1-1½ in. in diameter, white, changing into pale lilac, on jointed white or yellowish-floccose pedicels, usually in rich dichotomously branched peduncled cymes forming densely white or yellowish white floccose-tomentose short panicles at the end of the branchlets; calyx in bud turbinate, densely whitish or light tawny floccose-tomentose, strongly sulcate, 10-12 ribbed, 5-6-lobed, the lobes reflexed, lanceolate, acute, hardly mucronate; petals oblong and blunt or sometimes ovate and acuminate in the same flower, on a long filiform claw, waved and minutely ciliate; style very long; capsules oblong, mucronulate, under ½ an in. long, smooth and glabrous.

HAB.—Frequent all over Pegu and Martaban, in the tropical and moister upper mixed forests.—Fl. Apr.-May; Fr. May-June.—s: l.—SS.—Metam.—Sis.

REMARKS.—Wood dark brown, close-grained, heavy, the annual rings distinct and narrow. □'=53 pd. Valued for bows and spear-handles; also used for canoes and cart-wheels. Exudes red resin.

6. *L. Loudoni*, T. & B.—A small tree, the younger softer parts tomentose; leaves oblong to elliptically and oval-oblong, on a tomentose petiole 1-2 lin. long, rounded or obtuse at the base, blunt or acute, coriaceous, soon glabrous above, beneath almost scurfy greyish tomentose; flowers showy, first white, then blue, shortly pedicelled, forming scurfy tomentose terminal thyrsoid panicles; calyx densely tawny and scurfy tomentose, 8-ribbed and 8-lobed, the alternating ribs excurrent into the lanceolate acute lobes of 2 lin. length; petals 8, broadly obovate, cuneate at the base, nearly an in. long, crose and longish fringed; ovary silky-tomentose; capsule white-tomentose, globose.

HAB.—Adjoining provinces of Siam.—Fl. H.S.

7. *L. hypoleuca*, Kz.—A tree (60—70+25—30+5—9), shedding leaves in H.S., all parts glabrous; bark thin, whitish; leaves lanceolate to oblong-lanceolate, decurrent at the acuminate base, shortly petioled, acuminate, entire or waved, chartaceous, 6-8 in. long, whitish glaucous beneath; flowers middling sized, about 1-1½ in. in diameter, lilac, on jointed whitish puberous pedicels, solitary, or in poor, short-peduncled, minutely greyish puberulous cymes forming elongate panicles at the end of the branches; calyx in bud turbinate, whitish from a minute velvety pubescence, sulcate-10-ribbed, the alternate ribs excurrent into the 5 triangular acute lobes and forming a straight minute mucro; petals oblong, waved, about ½ an in. long; capsule oblong, mucronate, woody, about ¾ in. long.

HAB.—Common in the moister upper mixed forests of the Andamans.—Fl. June-July; Fr. C.S.—SS.—*SiS*.—Chloritic rocks, etc.

REMARKS.—Wood greyish brown, narrow-streaked; close-grained and heavy.

8. *L. flos-reginæ*, Retz; (*L. reginæ*, Roxb.; Bedd. Sylv. Madr. t. 29; Brand. For. Fl. 240).—*Pyimma*.—A tree (50—60+20—30+6—12), leafless during H.S., all parts glabrous; bark grey; leaves oblong to oblong-lanceolate, acute or rarely obtuse at the base, bluish acuminate, almost blunt or bluntish apiculate, shortly petioled, 5-9 in. long, chartaceous, entire, glabrous, more or less parallel-penninerved; flowers conspicuous, purplish lilac or rarely white, 2-3 in. in diameter, on rather thick greyish powdery pedicels, in small peduncled cymes, or the upper ones singly, forming terminal panicles; calyx turbinate in bud, whitish greyish or tawny powdery or velvety, strongly and deeply furrowed-ribbed, all or only the intermediate ribs abruptly broken at the base of the 6 lobes, the latter oblong-lanceolate, acute, thick coriaceous, thickened on the borders; petals about an inch long, almost orbicular, shortly clawed, crumpled and curled; stamens all equally long; capsules from oblong to nearly globose,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, mucronate, 6-celled; seeds brown and smooth, corky, irregularly 3-angular, laterally expanded into an oblong wing.

HAB.—Common in the mixed forests, all over Burma from Chittagong and Ava down to Tenasserim, up to 2,000 ft. elevation.—Fl. H.S.; Fr. C.S.—l.—SS.— $\infty$  *SiS*.

REMARKS.—Wood pale or dark brown, rather heavy, streaked, fibrous, but close-grained, takes a fine polish.  $\square^1 = 37$  pd.—Used for house-posts, planking, beams, scantling for roofs, carts, boats, paddles, oars, etc. Exudes a resin.

9. *L. macrocarpa*, Wall.—*Kone-pyimma*.—A tree (30—40+8—15+5—3), leafless in H.S., all parts glabrous; leaves oblong to ovate-oblong, shortly petioled, usually large, especially those of the young shoots (attaining sometimes  $1\frac{1}{2}$  ft. in length), the older ones varying from 5-6 to 9 in. in length, blunt, bluntish apiculate or rarely acuminate, chartaceous, entire, glabrous; flowers from 3 to  $3\frac{1}{2}$  in. in diameter, lilac or purplish lilac, on rather thick greyish powdery pedicels, singly or by 2 or 3 in peduncled cymes, forming poor and rather short panicles at the end of the branchlets; calyx in bud oblong-turbinate, greyish velvety, finely sulcate, but not ribbed, the 6 lanceolate acute lobes not thickened along the borders; petals 1-1 $\frac{1}{2}$  in. long, broadly elliptical or almost orbicular, clawed, crumpled and waved; stamens all equally long; capsules 1-1 $\frac{1}{2}$  in. long, woody, oblong, mucronate; seeds as in the preceding species, but larger.

HAB.—Common in the mixed and open forests, from Ava and Martaban as far down as Moulmein.—Fl. H.S.; Fr. C.S.—l.—SS.— $\infty$ .

10. *L. villosa*, Wall.—*Young-ka-lag*.—A tree (40—50+15—20

+3—5), shedding leaves in H.S., all softer parts shortly and softly pubescent; leaves ovate to ovate-oblong, on a very short pubescent petiole, rounded at the base, more or less acuminate, firmly membranous, 2-4 in. long, minutely velvety above, shortly and almost greyish pubescent or puberulous beneath; flowers small, whitish, on slender pubescent pedicels in peduncled cymes, forming softly, but shortly pubescent contracted panicles at the end of the branchlets; calyx in bud turbinate, densely and shortly greyish puberulous, 4-5- or 6-ribbed, the ribs almost wing-like, lobes as many as ribs, triangular, acute, as long as the tube; petals minute, not longer than the calyx-lobes, cuneate-lanceolate, acute; anthers purple; capsule oblong, about  $\frac{1}{2}$  an in. long, mucronulate, 4-6-valved.

HAB.—Frequent in the tropical forests along the slopes of the Pegu Yomah, rather rare in those of Martaban.—Fl. June.—s.—SS.=SiS. Metam.

REMARKS.—Wood pale brown, rather heavy, somewhat close-grained, rather coarsely fibrous. Not much used. □'=40 pd.

### DUABANGA, Ham.

Calyx-tube broadly turbinate, adnate to the base of the ovary, 4-7-lobed, the lobes very thick, spreading. Petals 4-7, shortly clawed. Stamens numerous, inserted in a single row round a perigynous ring; filaments incurved, thick-filiform. Ovary 4-8-celled, with a hollow axis and very numerous ascending ovules in each cell irregularly attached to the very thick placentas; style elongate, flexuose, with a capitately 4-8-lobed stigma. Capsule supported by the thick spreading calyx, thick coriaceous, perfectly or imperfectly 4-8-celled, opening loculicidally into 4-8 valves. Seeds many, scabiform, at both ends produced, narrowly winged on the upper margin.—Trees, with distichous, opposite, entire leaves. Flowers usually large, in pendulous terminal panicles.

1. *D. sonneratioides*, Buch.—*Myouk-gue*.—A tree (80—100 + 50—80 + 10—12), shedding leaves in H.S., all parts glabrous, the branchlets 4-cornered and drooping; bark dark grey, transversely wrinkled and fissured; cut dryish, pale coloured; leaves oblong to ovate-oblong, rounded or almost cordate at the base, on a short thick petiole, shortly acuminate, firmly chartaceous, 7-12 in. long, entire, glabrous, glaucous beneath; flowers about 2-2 $\frac{1}{2}$  in. in diameter, white, on thick jointed pedicels tapering downwards, singly or by threes, on short peduncles and forming a short, drooping, glabrous panicle at the end of the branchlets; petals cuneate-obovate, crisped along the borders, about an inch long; capsule the size of a small wood-apple, ovoid-globose, glabrous.

HAB.—Frequent in the tropical and mixed forests all over Burma from Chittagong and Ava down to Tenasserim, rather rare in the dry districts of Prome.—Fl. March-Apr.; Fr. May.—l & s: l.—SS.=Metam. SiS., etc.

HAB.—Common in the moister upper mixed forests of the Andamans.—Fl. June-July; Fr. C.S.—SS=*SiS*.—Chloritic rocks, etc.

REMARKS.—Wood greyish brown, narrow-streaked; close-grained and heavy.

8. *L. flos-reginæ*, Retz; (*L. reginæ*, Roxb.; Bedd. Sylv. Madr. t. 29; Brand. For. Fl. 240).—*Pyimma*.—A tree (50—60+20—30+6—12), leafless during H.S., all parts glabrous; bark grey; leaves oblong to oblong-lanceolate, acute or rarely obtuse at the base, bluntish acuminate, almost blunt or bluntish apiculate, shortly petioled, 5-9 in. long, chartaceous, entire, glabrous, more or less parallel-penninerved; flowers conspicuous, purplish lilac or rarely white, 2-3 in. in diameter, on rather thick greyish powdery pedicels, in small peduncled cymes, or the upper ones singly, forming terminal panicles; calyx turbinate in bud, whitish greyish or tawny powdery or velvety, strongly and deeply furrowed-ribbed, all or only the intermediate ribs abruptly broken at the base of the 6 lobes, the latter oblong-lanceolate, acute, thick coriaceous, thickened on the borders; petals about an inch long, almost orbicular, shortly clawed, crumpled and curled; stamens all equally long; capsules from oblong to nearly globose,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, mucronate, 6-celled; seeds brown and smooth, corky, irregularly 3-angular, laterally expanded into an oblong wing.

HAB.—Common in the mixed forests, all over Burma from Chittagong and Ava down to Tenasserim, up to 2,000 ft. elevation.—Fl. H.S.; Fr. C.S.—L.—SS= $\infty$  *SiS*.

REMARKS.—Wood pale or dark brown, rather heavy, streaked, fibrous, but close-grained, takes a fine polish. □' = 37 pd.—Used for house-posts, planking, beams, scantling for roofs, carts, boats, paddles, oars, etc. Exudes a resin.

9. *L. macrocarpa*, Wall.—*Kone-pyimma*.—A tree (30—40+8—15+5—3), leafless in H.S., all parts glabrous; leaves oblong to ovate-oblong, shortly petioled, usually large, especially those of the young shoots (attaining sometimes  $1\frac{1}{2}$  ft. in length), the older ones varying from 5-6 to 9 in. in length, blunt, bluntish apiculate or rarely acuminate, chartaceous, entire, glabrous; flowers from 3 to  $3\frac{1}{2}$  in. in diameter, lilac or purplish lilac, on rather thick greyish powdery pedicels, singly or by 2 or 3 in peduncled cymes, forming poor and rather short panicles at the end of the branchlets; calyx in bud oblong-turbinate, greyish velvety, finely sulcate, but not ribbed, the 6 lanceolate acute lobes not thickened along the borders; petals  $1-1\frac{1}{2}$  in. long, broadly elliptical or almost orbicular, clawed, crumpled and waved; stamens all equally long; capsules  $1-1\frac{1}{2}$  in. long, woody, oblong, mucronate; seeds as in the preceding species, but larger.

HAB.—Common in the mixed and open forests, from Ava and Martaban as far down as Moulmein.—Fl. H.S.; Fr. C.S.—L.—SS= $\infty$ .

10. *L. villosa*, Wall.—*Yung-ka-lag*.—A tree (40—50+15—20

+3—5), shedding leaves in H.S., all softer parts shortly and softly pubescent; leaves ovate to ovate-oblong, on a very short pubescent petiole, rounded at the base, more or less acuminate, firmly membranous, 2-4 in. long, minutely velvety above, shortly and almost greyish pubescent or puberulous beneath; flowers small, whitish, on slender pubescent pedicels in peduncled cymes, forming softly, but shortly pubescent contracted panicles at the end of the branchlets; calyx in bud turbinate, densely and shortly greyish puberulous, 4-5- or 6-ribbed, the ribs almost wing-like, lobes as many as ribs, triangular, acute, as long as the tube; petals minute, not longer than the calyx-lobes, cuneate-lanceolate, acute; anthers purple; capsule oblong, about  $\frac{1}{2}$  an in. long, mucronulate, 4-6-valved.

HAB.—Frequent in the tropical forests along the slopes of the Pegu Yomah, rather rare in those of Martaban.—Fl. June.—s.—SS.=SiS. Metam.

REMARKS.—Wood pale brown, rather heavy, somewhat close-grained, rather coarsely fibrous. Not much used. □'=40 pd.

### DUABANGA, Ham.

Calyx-tube broadly turbinate, adnate to the base of the ovary, 4-7-lobed, the lobes very thick, spreading. Petals 4-7, shortly clawed. Stamens numerous, inserted in a single row round a perigynous ring; filaments incurved, thick-filiform. Ovary 4-8-celled, with a hollow axis and very numerous ascending ovules in each cell irregularly attached to the very thick placentas; style elongate, flexuose, with a capitate 4-8-lobed stigma. Capsule supported by the thick spreading calyx, thick coriaceous, perfectly or imperfectly 4-8-celled, opening loculicidally into 4-8 valves. Seeds many, scobiform, at both ends produced, narrowly winged on the upper margin.—Trees, with distichous, opposite, entire leaves. Flowers usually large, in pendulous terminal panicles.

1. *D. sonneratioides*, Buch.—*Myouk-gne*.—A tree (80—100+50—80+10—12), shedding leaves in H.S., all parts glabrous, the branchlets 4-cornered and drooping; bark dark grey, transversely wrinkled and fissured; cut dryish, pale coloured; leaves oblong to ovate-oblong, rounded or almost cordate at the base, on a short thick petiole, shortly acuminate, firmly chartaceous, 7-12 in. long, entire, glabrous, glaucous beneath; flowers about 2-2 $\frac{1}{2}$  in. in diameter, white, on thick jointed pedicels tapering downwards, singly or by threes, on short peduncles and forming a short, drooping, glabrous panicle at the end of the branchlets; petals cuneate-obovate, crispate along the borders, about an inch long; capsule the size of a small wood-apple, ovoid-globose, glabrous.

HAB.—Frequent in the tropical and mixed forests all over Burma from Chittagong and Ava down to Tenasserim, rather rare in the dry districts of Prome.—Fl. March-Apr.; Fr. May.—l & s: l.—SS.=Metam. SiS., etc.

REMARKS.—Wood yellowish, turning pale brown or greyish, somewhat mottled, heavy, coarsely fibrous, but rather close-grained, rather hard, takes good polish. □'=30 pd. Used in house-building.

### SONNERATIA, L.f.

Calyx thick coriaceous, the tube broadly bell-shaped, at the base adnate to the ovary, 4-6-lobed, the lobes lanceolate or triangular. Petals 4-8, narrow, or none. Stamens numerous, inserted at the summit of the calyx-tube, inflected in bud. Ovary 10-15-celled, with very numerous ascending ovules covering the thick axile placentas; style elongate, with a funnel- or umbrella-shaped stigma. Fruit fleshy and indehiscent, supported by the persistent calyx and adnate to it at the base. Seeds immersed in pulp, angular.—Trees or shrubs, with opposite entire leaves. Flowers often large, solitary or by 3 to 5 in the axils of the upper leaves or at the end of the branchlets.

\* *Stigma infundibuliform-capitate, small. Calyx 6-8-lobed.*

○ *Petals present.*

Leaves obovate, broad; petals linear-lanceolate, dark-purple; calyx terete . . . . . *S. acida*.

○ ○ *No petals.*

Calyx in bud elliptically oblong, acute, the tube in bud obsolete, afterwards strongly 6-8-angled . . . . . *S. alba*.

Calyx in bud ovoid, obtuse, the tube remaining terete . . . . . *S. Griffithii*.

\* \* *Stigma large, nearly 3 lin. in diameter, conically umbrella-like. Calyx 4-lobed, terete.*

Leaves oblong to lanceolate; no petals . . . . . *S. apetala*.

1. *S. acida*, L.f.; Bedd. Sylv. Madr. 118; Brand. For. Fl. 242.—*Tapoo* or *tamoo*.—An evergreen small tree, 10 to 15 ft. high, all parts glabrous, the branchlets jointed, 4-cornered; leaves obovate to obovate-oblong, tapering into a broad but short petiole, blunt or usually retuse, entire, coriaceous, 2-4 in. long, glabrous, the nerves little or not visible; flowers about 2 in. in diameter, on very short thick peduncles, solitary at the end of the branchlets; calyx-tube terete, shallow, about  $\frac{3}{4}$  in. across, with usually 6, rarely 7 or 8, thick, reflexed, acute lobes; petals linear, acuminate,  $1\frac{1}{2}$  in. long, dark purple; filaments 1- $1\frac{1}{2}$  in. long; ripe berries 2- $2\frac{1}{2}$  in. in diameter, depressed-globular, many-celled.

HAB.—Frequent in the littoral (especially the mangrove) forests all along the coasts from Chittagong down to Tenasserim and the Andamans, ascending the rivers as far up as the tidal waves.—Fl. R.S.; Fr. C.S.—1 (?)—SS.—Sal.

REMARKS.—Wood soft, light and perishable.

2. *S. alba*, Sm.—An evergreen small tree, 10 to 15 ft. high, remaining often shrubby, all parts glabrous, the branchlets rather terete; leaves obovate or broadly obovate, at the base decurrent on the rather short petiole, blunt or retuse, 2-4 in. long, coriaceous,

glabrous, the nerves little visible; flowers rather large, about  $1\frac{1}{2}$  to 2 in. in diameter, sessile on the short jointed pedicel (the base of the calyx finally elongating into a spurious pedicel), usually by 2 or 3, each seated on a terete jointed peduncle at the end of the branchlets; calyx in bud elliptically oblong, acute, obsoletely cornered at the base, afterwards sharply 6- or rarely 7-8-angular; lobes as many as angles, oblong-lanceolate, acute; petals none; stamens about  $1\frac{1}{2}$  in. long; stigma funnel-shaped; berries supported by the sharply angular turbinate calyx, depressed-globose.

HAB.—In the littoral forests along the coast of the Andamans.—Fl. Apr.-May.—l.—SS.—Sal.

3. *S. Griffithii*, Kz.—*Tapyoo*.—An evergreen tree, 30 to 40 ft. high, all parts quite glabrous, the branchlets terete or 4-cornered; leaves obovate to obovate- or deltoid-oblong, blunt or retuse, at the base decurrent on the rather short petiole, coriaceous, 3-5 in. long, glaucous-green; flowers pure white, about  $1\frac{1}{2}$  in. in diameter, sessile on the short jointed pedicel, solitary, on a jointed terete peduncle at the end of the branchlets; calyx in bud ovoid, blunt, also in fruit quite terete, 6- rarely 7-8-lobed, the lobes oblong, acute; stamens and stigma as in preceding species; berries (according to Griffith) globose, the size of a poppy capsule, on both sides complanate, crowned by the remains of the style and supported by the terete reflexed-lobed calyx.

HAB.—Common in the littoral forests from Pegu down to Tenasserim, ascending the rivers as far as they are brackish.—Fl. Apr.-May.—s.—SS.—Sal.

4. *S. apetala*, Buch.; Bedd. Sylv. Madr. 118, t. 15, f. 1.—*Kan-pala*.—An evergreen tree (40—50 + 15—25 + 3—4), all parts glabrous, the branches pendulous, and the foliage of a light glaucous-green; leaves from oblong-lanceolate to lanceolate and linear-lanceolate, tapering into a rather long petiole, narrowed at the apex and blunt, 3-4 in. long, coriaceous, glaucous-green, the nerves indistinct; flowers rather small, whitish, apetalous, about an inch in diameter, on terete or 4-cornered about an inch long peduncles, usually by 3-5 at the end of the branchlets; calyx in bud oblong, bluntish, terete, 4-lobed, the lobes oblong, acute; stamens as long as the calyx-lobes; stigma very large, conically peltate; berries globular, as large as a bullet, 4-6-celled, supported by the terete erect-lobed calyx.

HAB.—Very common in the littoral (chiefly the tidal) forests of the coasts of Pegu down to Tenasserim, ascending the rivers as far as they are brackish.—Fl. June-July; Fr. R.S.—l.—SS.—Sal.

REMARKS.—Wood red, coarse-grained, strong and hard. Good for house-building, packing-boxes, etc.

## PUNICA, L.

Calyx persistent, 5-7-lobed, the tube at the base adnate to the ovary, turbinate, widened beyond the ovary. Petals as many as calyx-lobes, inserted at the summit of the calyx-tube. Stamens numerous, in many rows at the summit of the calyx-tube; filaments filiform, inflexed. Ovary inferior, many-celled, the cells superposed in 2 rows with numerous ovules in each attached in many rows to the strong parietal placentas or partitions; style filiform, flexuose, with a capitate stigma. Berry inferior, crowned by the calyx-limb, with a thick coriaceous rind, many-celled, the cells irregularly superposed, with the septa membranous. Seed numerous, angular, with a sappy red testa.—Small trees, with opposite or almost opposite clustered leaves, the branches sometimes spiny. Flowers large, solitary or almost clustered, axillary.

1. *P. granatum*, L.; Bedd. Sylv. Madr. 119; Brand. For. Fl. 241.—*Tha-lè*.—A small tree, often remaining shrubby, with terete sometimes spinescent branches, all parts glabrous; leaves usually crowded on the lateral short branchlets, oblong to oblong-lanceolate and linear, on a slender or short petiole, blunt or acute,  $1\frac{1}{2}$ -2 in. long, membranous, glabrous; flowers large, crimson (rarely white), on very short pedicels, axillary, solitary, or by 2 or 3; berries the size of an apple, spherical or nearly so, crowned by the tubular calyx-tube, yellowish green, smooth, containing numerous rose-coloured watery-pulpy oblong seeds in the numerous superposed cells.

HAB.—Not unfrequently cultivated in the drier parts of Ava and Promo.—Fl. Jan.-Feb.

## SAMYDACEÆ.

Flowers regular, usually hermaphrodite. Calyx coriaceous, persistent, 3-7-lobed, the lobes imbricate or valvate. Petals 3-7, rarely more, usually resembling the calyx-lobes in consistence, perigynous and imbricate in bud, or none. Disk cupular, annular or glandular. Stamens perigynous, indefinite or rarely definite, usually opposite the petals, and alternating with small glands or scales. Ovary superior or more or less inferior, 1-celled, with 2-3 or more several-ovuled parietal placentas; style simple, or 2-3 or more -cleft. Fruit indehiscent or capsular and opening into valves. Seeds often arillate, with a fleshy albumen. Embryo straight or nearly so, the radicle next the hilum; cotyledons flat.—Trees or shrubs, with usually alternating simple leaves. Stipules small or none. Flowers inconspicuous, in racemes, panicles, or clusters.

A small order of no particular uses. The timber of some species of *Homalium* is very close-grained and hard.

Petals none; stamens 6-15; ovary superior . . . . . *Casearia*.  
 Petals 4-12; stamens as many or more; ovary inferior . . . . . *Homalium*.

## CASEARIA, L.

Calyx-tube short or slightly elongated, the limb 4-5-lobed. Petals none. Stamens 6-15, or rarely more, alternating with as many short scales or staminodes, in a single row and united at the base into a perigynous ring. Ovary superior, 1-celled, with 3 or rarely 4 parietal placentas; style simple or shortly 3-lobed. Fruit somewhat succulent and opening into valves, or more fleshy and indehiscent. Seeds often with a bright-red arillus.—Trees or shrubs, with simple leaves often (not always) transparently dotted. Stipules lateral. Flowers usually small, in axillary clusters, rarely in corymbs.

\* Filaments very slender, many times longer than the anthers.

× Stamens and staminodes 8 each, separately inserted.

All parts glabrous; leaves coarsely crenate; flowers about 2 lin. in diameter; pedicels and calyx glabrous . . . . .

*C. canziala*.

Young shoots, calyx, pedicels, and often also the nerves of under side of the serrulate leaves, puberulous; flowers only a line in diameter . . . . .

*C. glomerata*.

×× Stamens and staminodes 8 each, united at the base and forming a broad disk round the ovary.

All parts, also the flowers and pedicels, more or less tomentose or puberulous . . . . .

*C. tomentosu*.

\* \* Filaments short, only as long as the anthers.

All parts, also the flowers and pedicels, more or less tomentose or puberulous . . . . .

*C. vareca*.

1. *C. canziala*, Wall.—A tree (40—50+15—25+3—4), leafless in H.S., all parts quite glabrous; bark  $\frac{1}{2}$  an in. thick, dry, brown, corky-fibrous like teak; leaves oblong, 7-8 in. long, shortly and bluntish acuminate, somewhat unequal and rounded at the base, on a glabrous petiole  $\frac{1}{2}$  an in. long, bristly-crenate-toothed, chartaceous, glabrous, conspicuously net-veined; flowers small, more than 2 lines in diameter, greenish, on 2-3 lin. long glabrous pedicels, clustered on a scaly shaggy tubercle arising from above the scars of the fallen leaves; sepals oblong, blunt, about a line long; stamens 8, not united at the base, alternating with as many very villous staminodes; filaments slender, many times longer than the anther; ovary hirsute at the apex; capsules about  $\frac{1}{2}$  an in. long or somewhat longer, oblong, 1-celled, 2-valved, containing 3 to 6 seeds enveloped in a red arillus.

HAB.—Frequent all over Pegu and Martaban, especially in the lower mixed forests.—Fl. Apr.-May; Fr. May-June.—s+l.—SS.—All.

REMARKS.—Wood hard, pale brown.

2 *C. glomerata*, Roxb.—A shrub, the young shoots minutely puberulous; leaves ovate to ovate-lanceolate, on a puberulous 2-3 lin. long petiole, somewhat unequal at the base, serrulate, chartaceous,  $2\frac{1}{2}$ -1 in. long, not pellucid-dotted, beneath on the midrib or on the nerves slightly puberulous, often quite glabrescent; stipules small, pubescent, deciduous; flowers minute, greenish, only about a line in diameter, on 1-2 lin. long, elongating, puberulous pedicels, clustered on scaly chaffy tubercles arising in the axils of the leaves; sepals 5, about half a line long, oblong, rather blunt, densely puberulous outside; stamens 8, not united at the base, alternating with as many clavate fringed staminodes; filaments slender, many times longer than the anther; ovary glabrous; style pubescent, rather short; stigma large; capsules on 4-5 lin. long stiff peduncles, elliptically oblong, 2-valved, berry like, about 6 lin. long.

Var. 1. *glabriuscula*: leaves almost glabrous.

Var. 2. *puberula*: petioles and leaves beneath on the nerves puberulous.

HAB.—var. 2: in Chittagong; var. 1: Ava, Kokhyen hills.

3. *C. Vareca*, Roxb.—An evergreen shrub, the shoots pubescent; leaves oblong, acute at the base, on a puberulous petiole about 2 lin. long or shorter, apiculate, serrulate, almost membranous, 3-4 in. long, glabrous above, puberulous or pubescent beneath; flowers minute, greenish white, on short glabrous pedicels, arising from densely scaly tawny-pubescent axillary buds, and clustered; calyx glabrous, the lobes orbicular, nearly a line long; stamens 8, included, the filaments rather shorter than the anthers, alternating with as many oblong short staminodes; ovary and the short style glabrous; capsules small, about 3 lin. long or somewhat longer, sessile, trigonously ovoid, glabrous, 1-celled, few-seeded, the seeds enveloped in a scarlet aril.

HAB.—Ava hills.

## HOMALIUM, Jacq.

Calyx-tube turbinate or oblong, at the base adhering to the ovary, the limb 4-12 lobed. Petals as many as calyx-lobes. Stamens 1 or more, opposite the petals, alternating with glands. Ovary 1-celled, half-inferior, with 3-5 parietal 2-6-ovuled placentas in the upper free part of the ovary; styles as many as placentas. Fruiting calyx slightly enlarged, surrounded by the persistent calyx-lobes and petals, usually opening at the top between the placentas in short valves.—Trees or shrubs, with simple, not

dotted leaves. Flowers in axillary spikes or racemes or in terminal panicles.

\* *Stamens solitary and opposite the petals.*

○ Flowers about 2 lin. in diameter.

Ovary villous; leaves coriaceous, tomentose or puberulous beneath; flowers tomentose, sessile; racemes robust, tomentose . . . *H. tomentosum.*

Ovary villous; leaves thin chartaceous, pubescent on the nerves; flowers tomentose, shortly pedicelled; racemes pubescent, slender . . . *H. Griffithianum.*

○○ Flowers about a line in diameter.

All parts, also the inflorescence, quite glabrous . . . *H. minutiflorum.*

\*\* *Stamens by 2 or more, opposite the petals. All parts quite glabrous.*

Ovary glabrous; racemes slender, glabrous; stamens by twos . . . *H. fatidum.*

Ovary tomentose; flowers longish pedicelled, in divaricate terminal panicles; stamens by threes . . . *H. Schlichii.*

1. *H. tomentosum*, Bth.—*Myouk-chaw*.—A tree (80—90+40—50+8—10), leafless in H.S., the branches horizontal, all softer parts more or less pubescent or tomentose; bark very thin, quite smooth, green-herbaceous below the white. secedent epidermis; leaves broadly obovate to obovate-oblong, on a very short thick petiole, blunt or apiculate, more or less repand-crenate, coriaceous, 3-5 in. long, glabrous above, beneath more or less puberulous or tomentose, strongly parallel-nerved; flowers minute, greenish, almost sessile, in small clusters, forming robust, tawny- or whitish tomentose racemes in the axils of the leaves and usually much longer than them; calyx-tube short, conical, tomentose; lobes 5 or 6, linear-oblong; petals as many and almost conform with the calyx-lobes; stamens 5, alternating with as many orange-coloured, spherical, almost sessile staminodes; filaments broader towards the base, about as long as the petals; anthers dark purple; ovary villous.

HAB.—Common in the mixed forests from Chittagong, Pegu, and Martaban down to Arracan, rare in Prome.—Fl. Fr. Nov.-Jan.—l.—SS.=∞ SiS.

REMARKS.—Wood light yellow, turning pale to greyish brown, very heavy, very close-grained, but of unequal fibre, rather soft, takes very fine polish. □=56 pd.—Used for teeth of harrows. Good for furniture.

2. *H. Griffithianum*, Kz.—A small tree, all younger parts softly tawny-pubescent; leaves oboval to obovate-oblong, on short, but slender densely-pubescent petioles, apiculate or shortly acuminate, especially towards the point more or less coarsely repand-toothed, thin chartaceous, while young pubescent all over, when adult, especially on the nerves, pubescent or pilose; flowers yellowish white, small, about 3 lin. in diameter, on short tomentose pedicels, solitary or more generally by 2 or 3, forming simple, slender, densely tawny-pubescent racemes or racemose panicles in the

axils of the leaves and usually as long or longer than them; calyx-tube short, conical, tomentose; lobes 6, linear, acuminate, pubescent, about  $\frac{1}{2}$  lin. long; petals 6, obovate-cuneate, twice the length of the calyx-lobes, very villous along the borders; stamens as long as the petals, filiform; ovary villous.

HAB.—Tenasserim.

3. *H. minutiflorum*, Kz.—A glabrous evergreen tree; leaves oblong, on a strong petiole 3-4 lin. long, bluntish apiculate, 3-5 in. long, coarsely crenate, thin coriaceous, glabrous; flowers minute, about half a line in diameter, on short, filiform, glabrous pedicels, clustered, forming simple or slightly branched glabrous racemes either solitary or by pairs from the axils of the leaves; calyx glabrous, the segments oblong-linear, villous-ciliate; filaments very slender, placed singly opposite the petals.

4. *H. fœtidum*, Bth.—A small evergreen tree, all parts quite glabrous; leaves from broadly oblong to elliptically oval, on a thick, smooth petiole 3-4 lin. long, apiculate, coarsely crenate-toothed, chartaceous, 4-6 in. long or longer, glabrous; flowers 6-10-merous, greenish, about 2 lin. in diameter, on very short puberulous pedicels, clustered, forming simple or branched, slender, minutely puberulous racemes in the axils of the leaves; calyx-tube shortly turbinate, greyish puberulous, the segments obovate-cuneate, ciliate; petals oblong-linear, densely fringed with white hairs, somewhat longer than the sepals; stamens by pairs opposite the petals, alternating with as many short obovate scales much longer than the petals; ovary glabrous, 4-lobed, with 4 styles.

HAB.—Tenasserim.

5. *H. Schlichii*, Kz.—An evergreen tree, all parts glabrous, leaves elliptical to ovate, acute at the base, on a strong petiole 3-4 lin. long, bluntish acuminate, 3-4 in. long, coriaceous, coarsely crenate, glabrous, glossy above; flowers small, on greyish pubescent 1-2 lin. long pedicels, forming grey-pubescent terminal divaricate panicles; calyx grey-pubescent, the segments linear-oblong, bluntish; petals almost conform but broader; stamens by threes opposite the petals; ovary tomentose.

HAB.—Tropical forests of Chittagong.—Fl. H.S.

## PASSIFLOREÆ.

Flowers hermaphrodite or unisexual, regular (in *Papayaceæ* the males and females dissimilar). Calyx-tube short or rarely elongate; lobes 3 or more, valvate, or more or less imbricate. Petals as many as calyx-lobes, inserted at their base and alternating and more or

less conform with them, free or united in a bell-shaped corolla, sometimes small or rarely wanting; corona simple or double, on the bottom or on the throat of the calyx, or cut into radiating or erect threads, seldom none. Disk ureolar or annular, or dissolved into glands or staminodes, rarely none. Stamens usually as many, rarely twice as many, as calyx-lobes, inserted at the base of the calyx, but often connate with the ovary-stalk to near the top; filaments free or monadelphous; anthers basifix or versatile, the cells opening inwards. Ovary superior, usually stalked, 1-celled, with 3 or rarely 5 parietal several-ovuled placentas; style 3-5-branched. Fruit indehiscent and succulent, or opening in valves between the placentas. Seeds serobienlate or cancellate, usually arillate. Albumen copious or scanty, fleshy. Embryo straight, with leafy cotyledons, the radicle next the hilum.—Climbers or rarely erect shrubs or trees, with alternate, simple, or divided leaves and stipules. Flowers solitary or in cymes or racemes, axillary. Tendrils axillary, often accompanying or terminating the peduncles, or none.

An order of no special interest to the forester. Papaw, the fruit of *Carica papaya*, is eaten, and so are the fruits of several *Passifloras*. Only 5 species are found in Burma, nearly all climbers or twiners.

### CARICA, L.

Flowers unisexual and sometimes hermaphrodite, the males and females dissimilar. Calyx very small, 5-lobed. Corolla of the males salver-shaped, with a slender elongate tube, in the females without tube and the lobes erect and deciduous. Stamens 10, inserted on the throat of the corolla, 5 of them alternating with short filaments, the others opposite the corolla-lobes and sessile; anthers adnate to the filament, erect, the connective often shortly produced. Ovary in the males reduced to a subulate rudiment, in the females free, sessile, 1- or spuriously 5-celled, with numerous (rarely few) ovules attached in two rows to the 5 placentas; style very short or none, terminated by 5 simple or lobed stigmas. Berry large, fleshy, many-seeded. Seeds with a mucous firmly adhering arillus, the testa smooth, wrinkled or echinate. Albumen fleshy.—Trees or shrubs, abounding in milky-juice, with alternate, large, palmate or rarely digitate-foliate leaves. Stipules none. Racemes or panicles often peduncled, axillary, without bracts.

1. *C. papaya*, L.; Brand. For. Fl. 244.—*Thimbaru*.—An ever-green glabrous tree (20—25 + 16—20 + 1—3), with a cylindrical naked stem forked-branched at the summit, and bearing there numerous crowded, large, long-petioled leaves; leaves on 1½–2½ ft.

long petioles, palmately 7-9-lobed, with the shortly acuminate lobes entire or again lobed, glabrous, entire,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  ft. in diameter; flowers white, very shortly pedicelled, cymose, forming long-peduncled, glabrous, pendulous, axillary, bractless panicles; corolla of females with a tube about  $\frac{3}{4}$  in. long, the lobes oblong-lanceolate, 4-5 lin. long; female flowers much larger and thick, sessile, without a tube, the petals oblong, about an inch long, saccate at the base; fruits oboval, obtuse, from  $\frac{1}{4}$  to 1 ft. long, green, then yellowish, smooth, obsoletely 5-angular, the whole inner surface covered with seeds, the latter about a line long, black, tubercled, surrounded by a succulent, thin, pellucid arillus.

HAB.—Generally cultivated all over Burma and adjacent islands, sometimes springing up spontaneously.—Fl. Fr. nearly the whole year. SS.=∞.

REMARKS.—Wood spongy, fibrous, coarse and very perishable. Exudes a white resin. The milky juice of the unripe fruit is a powerful vermifuge. Water impregnated with the milky juice makes all sorts of meat washed in it tender.

### DATISCEAE.

Flowers regular, dioecious, rarely hermaphrodite or polygamous. Males: calyx-tube very short or hemispherical; lobes 3-9, short, equal or unequal. Petals none or 8. Stamens 4-25, opposite the calyx-lobes; anthers 2-celled. Rudiment of ovary minute or none. Females and hermaphrodites: calyx-tube adnate to the ovary; lobes 3-8. Stamens as in the males or reduced to staminodes. Ovary 1-celled, open or closed at the summit; placentas parietal, with many anatropous ovules in 2 or more series; styles as many as placentas, simple or 2-parted, stigmatic inside or terminated by capitate stigmas. Capsule membranous or coriaceous, dehiscent between the styles, many-seeded. Seeds minute, the testa punctate or striate. Embryo cylindrical, imbedded in the axis of the scanty albumen; radicle elongate, next the hilum.—Large trees or herbs, with simple or compound leaves.

### TETRAMELES, R. Br.

Flowers dioecious. Petals none. Males: calyx-tube very short; lobes 4, equal or unequal. Stamens 4, inserted round a depressed disk; filaments elongate; anthers didymous. Ovary-rudiment 4-angular or none. Females: calyx-tube almost 4-angular, with 4 short lobes. Staminodes none. Ovary open at the apex, the ovules inserted in 3-4 rows on the parietal placentas; styles 4, short, almost clavate. Capsule membranous, open at the summit and crowned by the 4 styles.—Large trees. Flowers in spikes simple in females and paniced in the males.

1. *T. nudiflora*, R. Br.; Bedd. Sylv. Madr. t. 212.—*Thit-pouk*.—A tree (120—150 + 80—100 + 10—15), leafless during H.S., the young shoots tawny pubescent or velvety, the trunk much buttressed at the base; bark grey,  $\frac{1}{4}$  in. thick, smooth, beset with numerous bursted warts about an inch thick, the outer pergamaceous skin easily separating; cut dry, pale brown; leaves rotundate or broadly ovate, on  $2\frac{1}{2}$ –4 in. long petioles, rounded or almost truncate at the base, acute or acuminate, sometimes obscurely 3-lobed, irregularly bluntish toothed, membranous, 3–5 in. long and nearly as broad, beneath puberulous or pubescent; the nerves very prominent; flowers very small, apetalous, greenish, dioecious, sessile or nearly so, in puberulous spikes crowded at the apex of the rather thick leafless branchlets; calyx glandular-viscose, in the females about a line long; capsules ovoid-globular, the size of a pepper-kernel, membranous, viscose, open at the 4-styled almost 4-angular mouth.

HAB.—More or less common in the tropical forests all over Burma from Pegu and Martaban down to Tenasserim and the Andamans; rare along choungs of the Prome district.—Fl. March–Apr.; Fr. May–June.—s. l.—SS.—Metam. SiS.

REMARKS.—Wood brown, light, coarse-fibrous, rather loose-grained, valueless.

### ARALIACEÆ.

Flowers hermaphrodite or polygamous, regular. Calyx-limb forming a slightly raised line or short cup round the summit, truncate or toothed, or quite inconspicuous. Petals 5 or more, rarely 4, valvate, shortly inflected at the tip and often cohering (very rarely blunt and imbricate). Stamens as many as petals or sometimes more; anthers versatile, the cells parallel and opening longitudinally. Ovary inferior, 2- or more- rarely by abortion 1-celled, with a single anatropous ovule in each cell suspended from the summit; styles as many as cells, either distinct with small terminal stigmas, or united in a cone, or more or less reduced to a slight protuberance with inconspicuous stigmas. Fruit more or less drupaceous and indehiscent, the epicarp succulent, rarely almost dry and thin. Seeds, solitary, pendulous, enclosed in pyrenes. Albumen homogeneous or ruminant. Embryo minute, near the apex, with a superior radicle.—Trees, often palm-like, shrubs, or climbers, with alternate, compound, or rarely simple leaves. Stipules none. Flowers small, in umbels or heads, often collected into panicles.

This family includes the ginseng-root (*Panax ginseng*, Mey.), from China. Some species yield aromatic gum-resins. The wood of the trees belonging here is very perishable and valueless. The species described are all that are known from Burma.

\* *Petals more or less imbricate in bud. Gynoecium 2-5-merous.*

Styles free; leaves pinnate or decompound . . . . . *Aralia*.

\* \* *Petals calvate in bud, or rarely firmly cohering.*

○ Stamens as many as petals.

+ Albumen homogeneous.

× Ovary usually 2- (rarely 1-4) -celled. Flowers 5-merous.

Styles from the base free, erect, then recurved; leaves decompound, 1-foliate, or rarely pinnate or digitate; pedicels jointed under the calyx . . . . . *Panax*.

Stigma sessile and diverging; styles united in a column; leaves palmatifid or lobed; pedicels not jointed . . . . . *Brassaiopsis*.

× × Ovary 5- or more (rarely by abortion 3-4) -celled.

† Pedicels jointed below the calyx; leaves pinnate . . . . . *Polyscias*.

† † Pedicels not jointed.

Leaves digitate; flowers 5-6 (rarely-8) -merous . . . . . *Heptapleurum*.

Leaves often palmatifid; flowers 8-12-merous . . . . . *Trevesia*.

† † Albumen ruminant.

Pedicels not jointed; ovary 1-celled; leaves pinnate or simple . . . . . *Arthrophyllum*.

Pedicels not jointed; leaves pinnately compound; ovary 2-celled . . . . . *Heteropanax*.

Pedicels jointed; leaves digitate . . . . . *Macropanax*.

○ ○ Stamens numerous; petals firmly cohering; gynoecium up to 100-merous; leaves digitate . . . . . *Tupidanthus*.

## ARALIA, L.

Calyx-limb somewhat prominent, truncate, repand or very shortly 5-toothed. Petals 5, blunt or very shortly inflexed, acuminate, more or less imbricate in bud. Stamens 5; anthers oblong or rarely ovate. Disk almost flat or sometimes conical, with a free border. Ovary 2-5-celled; styles free or shortly united, the stigmas terminal. Fruits laterally compressed or (in a dried state) 3-5-cornered, the pericarp fleshy; pyrenes 2-5, compressed, crustaceous or hard. Albumen homogeneous.—Perennials, shrubs, or small trees, often armed with bristles or thorns, the stipules somewhat prominent from the base of the petiole. Leaves alternate, pinnate or pinnately decompound. Flowers usually polygamously dioecious, in umbels, forming racemes or panicles. Pedicels jointed.

1. *A. armata*, Seem.—An evergreen small tree; leaves decompound, the petiole and rachises all glabrous and sparingly beset with hooked thorns; leaflets ovate-oblong or oblong, on very short hispid petiolules or almost sessile, finely acuminate, serrulate, membranous,  $1\frac{1}{2}$ -2 in. long, minutely hispid and, especially along the nerves, sprinkled with stiff bristles; flowers minute, whitish, on stiff, about 2 lin. long; hispid pedicels, forming small peduncled umbels arranged into large, lax, shortly hispid, but partially glabrescent, sparingly thorny panicles at the end of the branchlets; styles free, recurved; fruits the size of a pepper-kernel, glabrous, 5-merous.

HAB.—Tenasserim.—Fl. Aug.

## PANAX, L.

Calyx limb usually slightly prominent, truncate or shortly 5-toothed. Petals 5, valvate, often cohering with their tips. Stamens 5. Disk broad and not thick, the margins sometimes prominent. Ovary 2- rarely 3-celled; styles 2, rarely 3, erect and sometimes cohering, then distinct and recurved. Fruit flattened, with a more or less succulent pericarp; pyrenes hardened, sometimes 2-ribbed on the dorsal edge. Albumen homogeneous.—Trees or shrubs, with decompose or 1-foliate, rarely pinnate or digitate leaves. Flowers in umbels, heads or racemes, forming usually compound racemes or panicles. Pedicels jointed.

Leaves decompose-tripinnate; leaflets bristly-serrate . . . . . *P. fruticosus*.  
 Leaves 1-foliate; leaflets acutely serrate . . . . . *P. cochleatum*.

1. *P. fruticosus*, L.—An evergreen shrub, all parts glabrous; leaves decompose-tripinnate, 1-1½ ft. long; leaflets variable in shape, usually more or less lanceolate, the lowermost ones usually broader, often variously lacinate, bristly-serrate, acuminate, 1-2 in. long, membranous, glabrous; flowers small, greenish white, in small umbellets forming large terminal glabrous panicles; calyx-limb 5-toothed; petals 5, linear, first spreading, then reflexed; berry 2- or 3-lobed, small, lead-coloured.

HAB.—Occasionally cultivated in the shade of villages in the southern parts of Burma.—Fl. Apr.

## BRASSAIOPSIS, Dene. &amp; Planch.

Calyx-limb usually somewhat prominent, minutely 5-toothed. Petals 5, valvate. Stamens 5; filaments filiform. Disk broad, usually narrowed into the style-column. Ovary 2- and often also 1-celled; stigmas sessile and diverging. Fruits ovoid or oblong, terete, the endocarp pergamaceous, didymous or entire, the pericarp more or less succulent or chartaceous. Seeds hemispherical or terete. Albumen homogeneous.—Small trees of the habit of *Trevesia*, with palmatifid or lobed leaves. Flowers in umbels arising from the dense woolly bracted end of the peduncle, forming terminal panicles. Pedicels not jointed below the calyx.

1. *B. palmata*, Kz.—An evergreen tree (15—20 + 8—15 + 1½—2), palm-like and simple or slightly branched at the top, the shoots covered with a tawny or rusty-coloured scurfy tomentum; leaves crowded at the end of the stem or branches, large, about a foot each way, palmately 7-9-lobed (the lobes broad, shortly acuminate and somewhat narrowed towards the base), remotely toothed, membranous, while young along with the petiole densely rusty

scurfy-tomentose, turning quite glabrous; flowers on long jointed pedicels, arising in umbels from a dense head of rusty-tomentose bractlets and forming large axillary racemes at the end of the branches; fruits elliptical, terete, the size of a large pea, crowned by the minute calyx-teeth and the slender style-column, containing 1 or often 2 pergamaceous 1-seeded pyrenes.

HAB.—Frequent in the tropical forests of the Andamans; also Chittagong.—Fr. May-June.—s.—SS.—SiS.

## HEPTAPLEURUM, Gaertn.

Calyx-limb hardly visible or the teeth minute. Petals 5 or 6, rarely more, valvate. Stamens as many as petals. Disk convex or conical, in the male flowers concave. Ovary with as many cells as petals; styles united in a short cone or column, with as many sessile scarcely prominent stigmas as there are cells. Fruit almost globular (in a dried state often angular) with a fleshy pericarp; pyrenes laterally compressed, crustaceous, chartaceous or hard. Seeds laterally compressed. Albumen homogeneous.—Trees or tall shrubs, often climbing, with digitate or digitately compound leaves. Flowers usually unisexual, in umbels or racemes, forming large panicles or rarely racemes. Pedicels not jointed.

Climber, glabrous; stigmas dot-like, immersed on the ovary . . . *H. venulosum*.

Erect trees; styles united in an elongate column; leaflets on thick rather short petiolules, not lobed . . . *H. glaucum*.

Leaflets on very long and slender petiolules, usually pinnatifid, quite glabrous . . . *H. hypoleucum*.

1. *H. venulosum*, Seem.; Bedd. Sylv. Madr. 122; Brand. For. Fl. 249.—*Baloo-let-wa*.—An evergreen woody climber with cable-like stems, all parts glabrous; bark smooth, grey or almost white; leaves digitately 7-9-foliolate, long-petioled; leaflets on long petiolules, obovate-oblong to oblong, rounded at the base, more or less acuminate, entire, pergamaceous or almost coriaceous, nerved and laxly veined on both sides; flowers minute, greenish yellow, on slender pedicels, in small, long-peduncled umbellets, forming glabrous racemes collected into large terminal panicles; calyx hardly  $\frac{1}{2}$  lin. in diameter; petals  $\frac{1}{2}$  lin. long; fruits the size of a pepper-kernel, sharply angulate.

HAB.—Frequent in the mixed forests all over Burma from Chittagong and Ava down to Tenasserim and the Andamans.—Fl. Apr.-May.—s+l.—SS.—SiS. All., etc.

2. *H. glaucum*, Bth. & H.f.—An evergreen tree (20—30+10—15+3—4), the younger parts covered with a floccose, scurfy, grey or somewhat tawny tomentum, soon glabrescent; leaves very

long petioled, digitately 7-foliolate, more or less tawny or greyish floccose-scurfy while very young; leaflets oblong to oblong-ovate, on  $\frac{1}{2}$  to 3 in. long petiolules, very variable in size (from 5-10 in. long), rounded or obtuse at the base, acuminate, simple, entire or remotely serrate, coriaceous, glaucous beneath; flowers small, on scurfy long pedicels, in long-peduncled umbels collected into tawny scurfy-tomentose racemes or panicles at the end of the branches and usually shorter than the petioles; styles united into a column at the summit, diverging into 5 stigmatic lobes; fruits globular, the size of a small pea, fugaceously scurfy-tomentose while young, in a dried state bluntnish 5-cornered.

HAB.—Frequent in the drier hill forests of the Martaban hills, at 5,000 to 7,000 ft. elevation.—Fr. March.—s.—SS.—Metam.

3. *H. hypoleucum*, Kz.—An evergreen tree, about 30 to 40 ft. high, remaining stunted and much branched in higher regions, all parts glabrous; leaves on petioles 14 to 20 in. long, digitately 5-7-foliolate, scurfy tomentose while very young; leaflets on slender petiolules 3-4 in. long, oblong or elliptically oblong, obtuse or rotundate at the base, very variable in size (6-12 in. long), pinnatifid (the 5-7 lobes much acuminate), rarely simple, entire or serrate-toothed, quite glabrous, chartaceous, glaucous or almost whitish beneath; flowers tomentose, very shortly pedicelled, in long-peduncled densely scurfy head-like umbels forming racemes arranged into panicles.

HAB.—Not unfrequent in the drier hill forests of Martaban, at 6,000 ft. elevation; also Ava, Khakyen hills.—SS.—Metam.

## TREVESIA, Vis.

Calyx-limb entire, waved or repand-toothed. Petals 8-12, valvate. Stamens as many as petals. Disk convex, conical or tapering into the style-column. Ovary 8-12-celled; styles united in a short cone or elongated column, the stigmas terminal, sessile and annular. Fruit ovoid or almost globular (in a dried state often furrowed) with a fleshy epicarp; pyrenes laterally compressed, pergamaceous or crustaceous. Seeds laterally compressed. Albumen homogeneous.—Small trees or shrubs, often armed, with palmately lobed or digitate leaves. Flowers polygamous, rather large, umbellate, in panicles. Pedicels not jointed.

1. *T. palmata*, Vis.—Baw.—An evergreen treelet (10—15+6—10+ $\frac{1}{2}$ —1), palm-like, armed with short conical very sharp thorns, the young shoots rusty mealy-tomentose; leaves large, about 2 ft. in diameter, on a very long somewhat spiny petiole, usually deeply palmately 7-9-lobed, with the acute or shortly acuminate lobes

more or less narrowed at base (in younger plants often so much as to leave only the ribs as a connecting link with the lobe-blades), remotely serrate-toothed, thick membranous, while very young sprinkled with a stellate tawny down, soon turning quite glabrous, the ribs sharply prominent on the upper side; flowers rather large, on slender pedicels, in long-peduncled umbels forming terminal racemes or panicles more or less sprinkled with rusty-stellate hairs; calyx and petals outside rusty stellate-puberulous; fruits the size of a bullet, almost glabrous, terete, crowned by the short, thick style-column.

HAB.—Common in the tropical forests of Ava, Chittagong, and Martaban down to Tenasserim, rather rare in the Pegu Yomah, up to 4,000 ft. elevation.—Fl. March-April; Fr. June-July—s.—SS.=SiS. *Metam*.

### ARTHROPHYLLUM, Bl.

Calyx-teeth 5, short. Petals 5, valvate. Stamens 5. Disk expanded, with a free waved margin. Ovary 1-celled, with a solitary ovule, the very short style confluent with the raised centre of the disk. Fruit ovoid or almost globose, 1-celled and 1-seeded. Albumen ruminant.—Trees, with alternate or occasionally opposite pinnately compound or simple leaves. Umbellets forming larger umbels. Pedicels not jointed.

1. *A. Javanicum*, Bl.—An evergreen palm-like tree (35—40 + 30—35 + 2—3½), all parts glabrous, the trunk simple or slightly branched at the top; leaves unpaired pinnate, or the floral smaller ones usually simple or variously reduced, long-peduncled, crowded at the apex of the stem, glabrous; leaflets in 7-8 pairs with an odd one, obliquely ovate, acute at the rounded base, on long slender petiolules, shortly and rather abruptly acuminate, 3-4 in. long, pergamaceous, glabrous, pale-coloured beneath; flowers rather small, white, on slender fugaceously woolly pedicels up to 2 lin. long, forming small fugaceously rusty or tawny woolly but soon glabrescent umbellets collected into larger ones usually furnished with simple or irregularly 3-foliolate floral leaves; petals about a line long; calyx of fertile flowers ovoid, more than a line long, minutely toothed; berries ovoid-oblong, on rather stiff pedicels ½-¾ in. long, about 3-4 lin. long, smooth, crowned by the opercle-like disk.

HAB.—Frequent in the tropical forests of the western coast of South Andaman.—s.—SS.=SiS., etc.

### HETEROPANAX, Seem.

Calyx-limb minutely toothed. Petals 5, valvate. Stamens 5; filaments filiform; anthers ovate. Disk nearly flat. Ovary 2-

celled; styles 2, filiform, free from the base, the stigmas nearly terminal. Fruits almost didymous, laterally compressed, coriaceous; pyrenes crustaceous or hard. Seeds compressed. Albumen ruminate.—Trees, with pinnately decompound leaves. Flowers umbelled, in racemes, forming terminal panicles. Pedicels not jointed.

1. *H. fragrans*, Seem.; Brand. For. Fl. 249.—*Ta-chan-sa*.—A tree (50—60 + 25—30 + 4—5), remaining stunted in poor soils, leafless during H.S., all parts glabrous; bark about an inch thick, smooth, grey; cut sappy, pale-coloured; leaves large, pinnately decompound, glabrous, the pinnæ at their forks usually supported by a pair of simple opposite leaflets; leaflets variable in size, usually 4-5 in. long, ovate, on rather short, thick petiolules, acute or obtuse at the base, acuminate, entire, almost coriaceous; flowers small, whitish tomentose, umbelled, the umbels collected in racemes, forming terminal, densely tawny-tomentose panicles shorter than the leaves; fruits compressed, broader than long, on rather long peduncles, more or less puberulous, turning glabrous and somewhat glaucous.

HAB.—Frequent in the leaf-shedding forests all over Burma from Chittagong and Ava down to Tenasserim, ascending into the upper dry forests to 3,000 ft. elevation—Fl. Jan.-Feb.; Fr. May-June.—1.—SS.=petrophilous and All. Dil.

REMARKS.—Wood light brown or grey, rather heavy, fibrous, but close-grained, very perishable.

### MACROPANAX, Miq.

Calyx-teeth 5, distinct. Petals 5, valvate. Stamens 5; filaments filiform; anthers ovate or oblong. Disk thick, cushion-like, or almost conical, in the centre produced into the style-column. Ovary 2-celled; styles united in a column, the stigmas terminal. Fruits nearly globular or ovoid, fleshy; pyrenes chartaceous or crustaceous. Seeds rather thick, compressed on the back, flat or concave in front. Albumen ruminate or much wrinkled.—Trees or shrubs, thorny or unarmed, with digitate leaves. Flowers polygamous, umbelled, or rarely in heads, forming large panicles. Pedicels jointed at apex.

1. *M. oreophilum*, Miq.—An evergreen tree (30—40 + 20—30 + 2—3), all parts glabrous; leaves digitately 5-9-foliolate, glabrous, on a long petiole; leaflets lanceolate to oblong-lanceolate, 5-6 in. long, on rather long petiolules, obtuse or acute at the base, acuminate, serrate-toothed; flowers small, slenderly pedicelled, forming rusty-puberulous racemes collected into large panicles.

HAB.—Frequent in the damp and drier hill forests of the Martaban hills east of Tounghoo, at 5,000 to 6,000 ft. elevation; also Ava, Kakhyen hills.—s.—SS.=Metam.

## TUPIDANTHUS, Hf. &amp; Th.

Calyx-tube clavate-hemispherical, the limb truncate, closely concrete with the calyptra-like united petals. Stamens very numerous; filaments thick-subulate; anthers oblong. Disk convex. Ovary many-celled, the cells radiate, very narrow; styles none. Stigmas up to 90 and more, sessile, arranged in sinuose lines round the centre of the obscurely lobed disk. Berry coriaceous, many-celled.—Scandent trees, with almost cable-like stem and digitate leaves. Flowers rather large, umbelled, collected into a raceme or panicle. Pedicels not jointed.

1. *T. calyptratus*, Hf. and Th.—An evergreen scandent tree, 20 to 30 ft. high, all parts glabrous; leaves large, long-petioled, digitately 5-8-foliolate; leaflets oblong to obovate-lanceolate, long-petioled, acuminate, entire, coriaceous, glabrous; flowers rather large, greenish, on thick half an inch long pedicels, umbelled and forming a short, robust, lateral, glabrous raceme; calyx  $\frac{1}{2}$ – $\frac{3}{4}$  in. across, very thick.

HAB.—Tropical forests of the eastern slopes of the Arracan Yomah.

## CORNACEÆ.

Flowers unisexual or hermaphrodite, regular. Calyx-tube adnate to the ovary, the limb forming a raised border, persistent, truncate, or with as many teeth as petals. Petals 4 or 5, rarely more, (imbricate or) valvate, inserted round an epigynous disk or on the calyx-border, rarely wanting; stamens as many, or rarely 2-4 times as many, as petals, and inserted with them; filaments filiform or complanate; anthers with parallel cells opening longitudinally. Disk epigynous or central, variously shaped. Ovary inferior, 1-4-celled, with 1 or rarely 2 anatropous pendulous ovules in each cell; style simple, with a terminal, entire, or rarely lobed, or 2-3-cleft stigma. Fruit an indehiscent drupe, with an 1-4-celled stone or rarely 2 bony or crustaceous pyrenes. Seeds pendulous. Albumen fleshy. Embryo straight, nearly as long as the albumen, the radicle superior and shorter than the flat usually leafy cotyledons.—Trees or shrubs, rarely herbs, with opposite or rarely alternate, simple, or slightly-lobed leaves. Stipules none. Flowers usually small, in axillary or terminal heads, cymes, or corymbose panicles.

An order of little importance. The bark of a few species of *Cornus* ranks amongst the best tonics in North America, and the timber of a few species of *Alangium* and *Marlea* is good. The Burmese species are all woody plants.

\* *Petals narrow-linear. Anthers basifix. Style elongate.*  
 Albumen ruminatè . . . . . *Alangium.*  
 Albumen homogeneous . . . . . *Marlea.*  
 \*\* *Petals short. Anthers dorsifix. Style short. Petals 4 Cornus.*

## ALANGIUM, Lamk.

Flowers hermaphrodite. Calyx-tube turbinate, often sulcate, the limb truncate or 5- to 10-toothed. Petals 5-10, narrow-linear, valvate; stamens as many, or more usually 2-4 times as many, as petals; anthers elongate-linear, basifix. Disk cushion-like, depressed on the centre, lobed or crenulate. Ovary 1-celled, with a single pendulous ovule; style elongate-clavate or filiform; stigma entire, lobed, or cleft. Drupe crowned by the calyx-limb. Albumen ruminatè.—Shrubs or small trees, sometimes spinescent, with alternate leaves 3-nerved at base. Flowers in axillary clusters or cymes; pedicels jointed.

A tree, often armed; petioles 6-8 lin. long; petals 10-6; filaments densely pilose at the base . . . . . *A. decapetalum.*  
 A large climber, unarmed; petioles shorter; petals 6; filaments sparingly pilose at the base . . . . . *A. Sundanum.*

1. *A. decapetalum*, Lamk. (*A. Lamarckii*, Bedd. Sylv. Madr. t. 215; Brand. For. Fl. 250.)—A small tree or shrub, unarmed, or in drier climates the branches spinescent, all softer parts more or less pubescent or glabrescent; leaves variable, from linear-oblong to elliptical and elliptically-obovate, on a shorter or longer, slender, pubescent or glabrous petiole, bluntish or shortly bluntish acuminate or apiculate, rounded to acute at the base, 3-5 in. long, entire, chartaceous, above glabrous or almost so, beneath shortly pubescent, puberulous or altogether glabrous; flowers cream-coloured or white, rather conspicuous, usually by 3 or fewer clustered in the axils of the leaves or above the scars of the fallen ones; pedicels short, few-bracted, tomentose; calyx densely tawny tomentose or velvety, more or less distinctly 5- to 10-toothed; petals 5-10, narrow-linear, about an inch long, blunt, tawny-velvety outside; stamens 3-4 times as many as petals; filaments very short, densely hirsute; drupes oblong,  $\frac{1}{4}$ - $\frac{1}{2}$  in. long, smooth, crowned by the calyx-limb, containing an oblong, 1-seeded, bony stone.

HAB.—Burma (according Rev. Mason).—Fl. Apr.-May.—1.

REMARKS.—Wood strong, very close and even-grained, dark brown, easy to work.

2. *A. Sundanum*, Miq.—A large evergreen climbing shrub, the leaf-buds slightly pubescent; leaves elliptical to elliptically oblong, on a slender glabrous petiole 2-4 lin. long, apiculate, 3-5 in. long, chartaceous, glabrous and rather glossy; flowers cream-

coloured, rather large, very shortly pedicelled, in small, grey-tomentose cymes at the end of the branches or from the axils of the leaves; calyx cupular, shorter than deep, about a line long, densely greyish or tawny-greyish tomentose; petals 6, more than  $\frac{1}{2}$  in. long, linear, pubescent; style glabrous; filaments sparingly pilose at the base only.

HAB.—Tropical forests of the Andamans.—Fl. Apr.-May.—s:1.—SS==SIS., etc.

### MARLEA, Roxb.

Flowers hermaphrodite; calyx-tube bell-shaped or almost cylindrical, the limb cupular, minutely 4-8-toothed. Petals 4-8, free, or at the base cohering into a tube, linear. Stamens as many as petals; filaments free or their base adhering to the petals; anthers narrow-linear, adnate, dehiscing laterally. Disk cupular or cushion-like. Ovary 1-3-celled, or 1-celled at the top and 3-celled below, the ovules solitary and pendulous; style slender, with an entire or lobed stigma. Drupe small, containing a small 1-2-celled and -seeded putamen. Albumen fleshy.—Trees or shrubs, with alternate, simple, or lobed leaves. Flowers in axillary, simple, or dichotomous cymes; pedicels jointed.

Petals about $\frac{1}{2}$ an in. long or shorter; connective glabrous; leaves glabrous	<i>M. begoniæfolia</i> .
Petals nearly an inch long; connective pilose and bearded; leaves puberulous beneath	<i>M. tomentosa</i> .

1. *M. begoniæfolia*, Roxb.; Brand. For. Fl. 251.—An evergreen tree (60-70 + 30—40 + 4—5), the young shoots tawny-pubescent; leaves from broadly and obliquely ovate-oblong to ovate, on a 1-1 $\frac{1}{2}$  in. long, soon glabrescent petiole, acuminate, simple, or angular-lobed, or often produced into 1-4 short acuminate lobes, membranous, 4-6 in. long, 3-5-nerved at the base, glabrous, or with a tuft of hairs in the nerve-axils beneath, the principal nerves often puberulous; flowers rather small, on short and thick minutely bracted jointed pedicels, forming a glabrous or puberulous, peduncled dichotomous cyme in the axils of the leaves and shorter than them; calyx glabrous or pubescent, short; petals 6-8, narrow-linear, glabrous outside, about  $\frac{1}{2}$  in. long or somewhat shorter; filaments short and broad, tawny hirsute; anthers and connective quite glabrous; style glabrous or appressed hirsute with a coherent 4-lobed stigma; disk glabrous; drupes ovoid, the size of a small cherry, crowned by the minute calyx-limb, containing a 2-celled hard nut.

HAB.—Rare in the tropical forests of Marlapan; Ava, Kakhien hills.—Fl. March-May.—s:1.—SS.—Metam.

2. *M. tomentosa*, Endl.—A tree (90—100 + 40—50 + 6—9), probably evergreen, all softer parts more or less puberulous; bark  $\frac{1}{2}$  in. thick, dark-grey, covered with small pustules; cut greenish pale-brown; leaves more or less oblique, broadly ovate to ovate-oblong, on a pubescent soon glabrescent petiole 1-1 $\frac{1}{2}$  in. long, shortly acuminate, simple or sometimes 4-5-lobed, 5-8 in. long, membranous, 5-6-nerved at the base, above along the nerves and beneath all over shortly puberulous; flowers conspicuous, white, turning yellowish, on  $\frac{1}{2}$  in. long, jointed, minutely puberulous, minutely 1-bracted pedicels, forming a dichotomous, minutely puberulous, peduncled cyme in the axils of the leaves longer than the petioles; calyx minutely velvety, with a spreading minutely 8-toothed limb; petals usually 8, nearly an inch long, minutely pubescent; stamens as many as petals; filaments short, compressed, ovate-oblong, very villous; anthers all along the connective villous and bearded towards the apex; disk minutely puberulous; style nearly an inch long, glabrous, capitately 4-lobed.

HAB.—Frequent in the tropical forests of Martaban.—Fl. March, Apr.—s: l.—SS.—Metam.

REMARKS.—Wood pale brown, close-grained, with a silvery lustre, rather closely fibrous.

## CORNUS, L.

Flowers hermaphrodite. Calyx-tube turbinate, urceolate or bell-shaped. Petals 4, oblong or ovate, valvate. Stamens 4; filaments subulate or filiform; anthers oblong. Disk cushion-like or obsolete. Ovary 2- very rarely 3-celled, the cells 1-ovuled; style filiform or columnar, with a capitate or truncate stigma. Drupe fleshy or sappy, containing a bony 2-celled putamen. Seeds compressed, the testa membranous. Albumen fleshy.—Trees or shrubs, rarely undershrubs, with opposite or very rarely alternate simple leaves. Flowers small, in dichotomously branched cymes or in nude or involuerate heads.

1. *C. oblonga*, Wall.—An evergreen (?) tree (20—30 + (?) + 1 $\frac{1}{2}$ —3), all parts glabrous; leaves lanceolate to oblong-lanceolate, tapering into a thick glabrous petiole  $\frac{1}{2}$ — $\frac{1}{2}$  in. long or somewhat longer, acuminate, entire, 3-5 in. long, almost coriaceous, glabrous, beneath glaucescent and the principal nerves sharply prominent, somewhat rough from inconspicuous thin appressed hairs, hollow-glandular along the nerves and in the nerve-axils; flowers small, white, on slender rather short pedicels, forming a terminal, shortly peduncled, slightly minutely pubescent or almost glabrous dense cyme at the end of the branchlets; calyx small, 4-toothed, minutely

silky puberulous; petals linear-oblong, about 2 lin. long, usually silvery appressed puberulous or glabrous outside; anthers purple; drupe ovate-oblong, crowned by the calyx-limb, smooth, the size of a pepper-kernel, containing a 2- very rarely a 3-celled putamen.

HAB.—Frequent in the drier hill forests of the Martaban hills east of Tounghon, at 4,000 to 7,000 ft. elevation.—Fl. Fr. March.—l.—SS.=Metam.

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## ADDITIONS AND CORRECTIONS.

P. 8, below line 4 from above, *insert* :

*Plumbaginea*.—Calyx tubular; stamens 5; ovary 1-celled, with a single ovule suspended from a free filiform placenta; styles or style-branches 5; seeds rarely albuminous.—Herbs or rarely shrubs, with radical or alternate leaves.

P. 8, after line 4 from beneath, *insert* :

*Gentianeae*.—Anthers free; ovary 1-celled with 2 or rarely more parietal placentas, rarely 2-celled; ovules numerous; style single; fruit a capsule, rarely indehiscent or berry-like; seeds albuminous.—Herbs, rarely shrubs or trees, sometimes twining; leaves opposite or rarely alternate.

P. 66, line 13 from below, *read* "*C. Roxburghii*" for "*C. religiosa*."

P. 73, line 25 from below, *read* **FLACOURTIA** for **FLO-COURTIA**.

P. 87, line 9 from below, *read* "half the size" for "doubled, smaller."

P. 88, line 7 from above, *read* "deliciously" for "delicious."

P. 96, line 19 from below, *read* "basal" for "bisal."

P. 121, No. 2. *H. scaphula*, Roxb., is an **Anisoptera**, and should be inserted after **Anisoptera glabra** on page 112.

P. 138, after 9. *Sterculia rubiginosa*, Vt., *insert* :

9b. *St. Roxburghii*, Wall.—An evergreen, middling-sized tree, all parts glabrous; leaves oblong to oval and oblong-lanceolate, rounded at the base, on a slender petiole  $\frac{3}{4}$ -1 in. long and thickened at both ends, cuspidate, 3-5 in. long, chartaceous, entire, glabrous; flowers small, scarlet, on capillary slightly stellate-hairy pedicels, forming slender axillary racemes up to 2 $\frac{1}{2}$  in. long; calyx bell-shaped-rotate, glabrous, about  $\frac{1}{2}$ - $\frac{3}{4}$  in. across, the lobes oblong-lanceolate, about 2-3 lin. long, acute; follicles oblong-lanceolate, somewhat curved, inflexed-acuminate, 2-3 in. long, crimson, roughish velvety outside, and quite glabrous and smooth inside, containing 4-8 ovoid black seeds.

HAB.—Chittagong.—Fl. Feb.-March; Fr. R.S.—s.

P. 139, line 17 from below, *insert* + after 120.

P. 194, line 3 from below, *read* **ATALANTIA** for **ATLAN-TIA**.

P. 233, line 23 from above, *read* *O. acuminata* for *O. Zeylanica*; and line 4 from below, *read* *O. acuminata*, Wall., for *O. Zeylanica*, L., and omit the citation of "Bedd. Sylv. Madr."

P. 257, after *Hippocratea macrantha*, Korth., insert :

4. *H. Lobbii*, Laws.—A climbing (?) shrub; leaves broadly elliptical, almost acuminate, entirely glabrous, 3-4 in. long by  $\frac{3}{4}$ -2 broad; cymes 2-3 times divided, shorter than the leaves; calyx-lobes elliptically oblong, entire, pubescent; petals elliptically ovate, slightly cohering at the base, entirely covered on the inside with dense ash-grey hairs, 2 lin. long; anthers almost sessile.—(After Lawson.)

HAB.—Upper Tonasserim.

P. 265, before *ZIZYPHUS*, insert :

2. *Berchemia polyphylla*, Wall.—An erect (?) shrub, the young branches puberulous; leaves ovate, blunt, on a puberulous petiole  $\frac{1}{4}$  in. long, 1-1 $\frac{1}{2}$  in. long; flowers on 1 $\frac{1}{2}$ -4 lin. long straight pedicels, forming axillary racemes; calyx 5-cleft, the lobes triangular, acute; petals 5, almost orbicular; stamens 5; fruit  $\frac{1}{2}$  in. long. Closely allied to *B. flavescens*.—(After Lawson.)

HAB.—Ava.

P. 267, after 4. *Zizyphus glabra*, Roxb., insert :

5. *Z. funiculosa*, Ham.—A large, evergreen, scandent shrub, armed with small recurved stipulary prickles, the young shoots puberulous; leaves lanceolate to ovate-lanceolate, rounded at the base, on a slender glabrous petiole up to  $\frac{1}{4}$  in. long, almost caudately but bluntish acuminate, finely serrulate, chartaceous, glabrous, 2-3 $\frac{1}{2}$  in. long, strongly 3-nerved, finely transversely veined and almost silky-glossy; flowers small, on puberulous pedicels a lin. long, clustered and forming 2-forked small short-peduncled tawny-pubescent cymelets arranged into elongate axillary panicles much longer than the leaves; calyx rusty-pubescent, about a line across, the lobes 3-angular, about  $\frac{1}{2}$  lin. long; petals small, orbicular, clawed.

HAB.—Ava hills.

P. 288, line 15 from above, read "tabular" for "tubular."

P. 328, after 6. *Connarus grandis*, Jack, insert :

7. *C. stictophyllus*, Kz.—A shrub or small tree, the young shoots rusty puberulous, the branchlets white and copiously corky-lenticellate; leaves pinnate, on a slender petiole while young (along with the rachis) fugaceously brown puberulous; leaflets in 2 pairs with a longer petioled odd one, elliptically oval to oval-oblong, on a slender petiole about a line long, rounded at the base, 1 $\frac{1}{2}$ -2 $\frac{1}{2}$  in. long, glabrous, pergamentaceous, apiculate, impressed-net-veined beneath, while young strongly bullate-dotted on the nerves; flowers rather small, on short tawny-tomentose pedicels, forming brachiate tawny-pubescent corymb-like cymes on rather slender peduncles of 1-2 in. length arising from the axils of the upper leaves or collected into a larger terminal corymb; calyx rusty or brown pubescent, the sepals linear-lanceolate, somewhat longer than a line, almost navicular-keeled; petals linear, bluntish, 3 lin. long, rusty or brown tomentose; stamens 10, the glabrous filaments united at base into a tube; ovary rusty-villous.

HAB.—Adjoining Siamese provinces.—Fl. May.

P. 342, in the key of *DALBERGIA*, omit lines 15 and 16, and correct thus :

× Pedicels slender, as long as the calyx; bracts and bract-  
lets long, persistent, and rather conspicuous.

Calyx-teeth as long as the tube; inflorescence glabrous . . . *D. stipulacea*.

× × Flowers almost sessile; bractlets minute and deciduous;  
calyx-teeth minute.

Branchlets smooth; inflorescence densely pubescent; calyx a line long; corolla 2-3 lines long . . . *D. volubilis*.  
 Branchlets verrucoso; panicles slender, almost glabrous; calyx  $\frac{1}{4}$  lin. long; corolla  $1\frac{1}{2}$  lin. long . . . *D. Thomsoni*.

P. 347, cut out 13. *Dalbergia rubiginosa*, Bth., and replace it by:

13. *D. Thomsoni*, Bth.—A large scandent shrub, probably evergreen, all parts nearly glabrous, the branchlets verrucoso; leaves unequally pinnate, shortly petioled, the petiole and rachis slightly pubescent; leaflets in 5-4 pairs with an odd one, shortly and slenderly petioluled, obovate, acute or nearly cuneate at the base, rounded or almost retuse,  $\frac{3}{4}$ -1 in. long, rarely somewhat larger, coriaceous, glabrous; flowers small, almost sessile, one-sided, forming forked and almost scorpioid slender cymes arranged into axillary or more usually terminal, slightly pubescent, glabrescent panicles, the bracts minute; calyx  $\frac{1}{2}$  lin. long, almost glabrous, the teeth minute; corolla about a line long or somewhat longer; stamens united into 2 separate sheaths; pods linear-oblong, 2-2 $\frac{1}{4}$  in. long by  $\frac{3}{4}$  broad, flat, greenish and not turning brown, narrowed from the middle into a very short stalk, veined on the centre.

HAB.—Rare in the tropical forests of the Kambala-toung, Pegu Yomah.

P. 381, line 19 from above, transpose the word "flexuose" to the line below, and insert it after "subulate."

P. 429, line 22 from below, add "Mart." after *PITHECOLOBIUM*.

P. 501, line 19 from below, read "yellow" for "velloy."

P. 506, line 13 from above, read *A. hispida* for *A. hispiad*.

P. 508, line 20 from above, read *A. cyanocarpum* for *cyano-carpa*.